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ABSTRACT

The Windows on the Wild national environmental education program aims at increasing the environmental literacy of young people using biodiversity as an organizing theme and strengthening the links between schools and the nation's zoos, aquariums, nature centers, and other nonformal educational institutions. This report presents the findings of an assessment of the needs, thinking, and current practices of educators that was undertaken before starting the program. Surveys were administered to a national sample of middle school science and social science teachers and a national sample of educators from zoos, aquariums, nature/science centers, museums, and botanical gardens. A total of 2081 teachers and 708 nonformal educators responded to the survey. Results indicate that both formal and nonformal educators overwhelmingly support environmental education and think that it should be a priority in their institutions. The educators surveyed were enthusiastic about supporting programs that linked formal classroom education with experiential learning at nonformal institutions. The majority of teachers expressed a need for educational resources to help them incorporate biodiversity into their teaching programs. Appendices include survey methodology, teacher education and nonformal education surveys and results, and a draft biodiversity education framework. Contains 12 references. (JRH)

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ED 398 075

WINDOWS ON THE WILD

Results of a National Biodiversity Education Survey

PUBLISHED BY WORLD WILDLIFE FUND WITH SUPPORT FROM EASTMAN KODAK COMPANY

PRODUCED IN COLLABORATION WITH THE UNIVERSITY OF WISCONSIN, STEVENS POINT

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World Wildlife Fund
1250 24th Street, NW
Washington, DC 20037

Foreword

The quote on the right, from a 14-year-old student in Newark, New Jersey, expresses the concerns of many of today's youth—including their conviction that we are failing to protect our wildlife and wildlands adequately. Indeed, it is because we and generations before us have mismanaged the environment that we must now turn to the next generation to forge solutions that will safeguard the air, the water, and other resources on which all life depends. It is a daunting task and one that will call for dedication, cooperation, and education on a global scale.

For today's youth to become effective partners in protecting the Earth, we must provide them with new tools and skills. World Wildlife Fund, with support from Eastman Kodak Company, is responding to this challenge through a national environmental education program called *Windows on the Wild. Windows* aims to increase environmental literacy of young people using biodiversity as an organizing theme. We hope in the process to strengthen the links between schools and the nation's zoos, aquariums, nature centers, and other nonformal educational institutions and to foster more meaningful experiences for students outside the classroom.

Before embarking on this program, we undertook an assessment of the needs, thinking, and current practices of educators. This report presents the findings of that assessment and discusses the implications for *Windows on the Wild*. We learned that educators overwhelmingly support environmental education and want more materials and training focusing on the topic of biodiversity. We also learned that the environment, despite competing demands for time and resources, ranks as a national education priority.

It is our hope that through education efforts such as *Windows on the Wild* we can motivate both young people and adults to translate their environmental concerns into concrete action to protect the Earth's rich biological diversity and to secure a better future for our children.

Kathryn S. Fuller

Kathryn S. Fuller
President
World Wildlife Fund

I hate to think about what we're losing. I know that most of the rain forest is already gone. But it's not just that. It's also the pollution and dirty water . . . and the animals and plants that are dying off. I think that nature is falling apart and that we don't understand what we're doing to it.

Middle School Student
Newark, NJ

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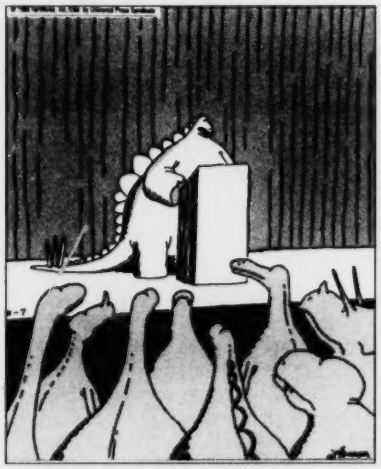

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"The picture's pretty bleak, gentlemen. . . . The world's climates are changing, the mammals are taking over, and we all have a brain about the size of a walnut."

The diversity of life forms, so numerous that we have yet to identify most of them, is the greatest wonder of this planet.

Edward O. Wilson
Biologist
Harvard University

Executive Summary

In 1993, World Wildlife Fund, with support from Eastman Kodak Company, launched a national environmental education program, called *Windows on the Wild*, to increase environmental literacy using biodiversity as the organizing theme. On the advice of an expert advisory board composed of teachers, zoo and aquarium educators, university professors, and other scientific and educational experts, *Windows* will initially target middle school students and educators. The program will also strive to strengthen the links between middle schools and nonformal institutions, including zoos, aquariums, nature centers, museums, and botanical gardens.

To assess educators' needs and help guide the development of *Windows on the Wild*, WWF, in collaboration with the University of Wisconsin at Stevens Point, conducted a national education survey. Two national samples of educators were selected to assess interest in, status of, and perceived needs related to biodiversity education. Surveys were administered to a national sample of middle school science and social science teachers and to a national sample of educators from zoos, aquariums, nature/science centers, museums, and botanical gardens. A total of 2081 teachers and 708 nonformal educators responded to the survey. This report summarizes the results of that survey.

In general, the surveys confirmed that both formal and nonformal educators overwhelmingly support environmental education and think that it should be a priority in their given institutions. They also believe strongly that biodiversity education efforts should be enhanced and that more biodiversity education would take place if they had additional materials and training. It is also clear that educators who were surveyed are enthusiastic about supporting programs that link formal classroom education with experiential learning at nonformal institutions, and would actively take part in such programs if given adequate resources.

The following key findings are taken from the survey results:

- The majority of middle school and nonformal educators agreed that biodiversity education should be established as a priority in their given institutions.

- The majority of teacher respondents expressed a need for teacher workshops related to biodiversity education.

- Both middle school and nonformal educators identified barriers (funding, time, etc.) that prevent them from conducting biodiversity education programs.

- The majority of teachers expressed a need for educational resources (teacher and student) to help them incorporate biodiversity into their teaching programs.

- The majority of nonformal educators would like assistance in developing and offering biodiversity education programs for schools.

A more fundamental, and formidable, challenge to large-scale sustainable development is changing ideas and attitudes about biodiversity. That requires a substantial education effort of a public for whom science in general, and biodiversity in particular, is often remote and mysterious. Fortunately, the inherent fascination of living things is a great aid to this educational challenge. It won't be easy—but is there really any choice?

Thomas E. Lovejoy
Assistant Secretary for
Environmental and External Affairs
Smithsonian Institution

Many of the 50,000 species of plants expected to vanish forever during our lives hold exceptional promise for producing food, fodder, wood, medicine—all the factors that increase the quality and stability of human existence on Earth.

Peter Raven
Director
Missouri Botanical Garden

• Both middle school and nonformal educators felt that, given appropriate resources, it would be beneficial for them to develop collaborative biodiversity education efforts.

• Environmental education is strongly supported as an important education initiative by both middle school and nonformal educators responding to this survey.

The results of this report, explained in more detail in the graphs and text in Sections 1 and 2, provide significant support and direction for WWF's *Windows on the Wild*. It is clear that both classroom teachers and nonformal educators see environmental and biodiversity education as a priority within their respective institutions. It is also apparent that both groups of educators feel they lack the necessary training, time, and resources to educate middle school students effectively on issues related to biodiversity. *Windows* can play a critical role in bridging this gap between the interests of educators to enhance biodiversity education and their inability to overcome identified barriers. By developing innovative materials and training opportunities for educators and by facilitating increased collaboration and partnerships between formal and nonformal educators, WWF can help create an effective and comprehensive biodiversity education program that addresses the needs identified in this survey.

Windows also has the potential to help expand efforts to educate the general public about biodiversity issues. According to a recent survey conducted by Peter D. Hart Research Associates[1], most Americans are not aware there is a problem with biodiversity and have never heard of the "loss of biological diversity." However, when respondents learned more about biodiversity and what scientists are saying about the consequences of loss of biodiversity, they ranked it as a serious threat. Given that formal and nonformal educators appear to be much better informed about biodiversity than the general population, they can be a conduit to increased public understanding of the issue by using the *Windows* program to sponsor community outreach programs focusing on biodiversity.

The *Windows* surveys and results, as well as more details about the methodology, are included in the appendices beginning on page 31. WWF is publishing the results of this survey in the hope that other educators will benefit from the findings and concertedly work together to enhance efforts to educate students, teachers, and the general public about biodiversity.

[1]From "Highlights from a National Public Opinion Study on Biodiversity" conducted for Defenders of Wildlife, July 20, 1993, by Peter D. Hart Research Associates, Inc.

Introduction

The island of Madagascar, off the east coast of Africa, contains two-thirds of all the chameleons on Earth, all the lemurs, and more than 10,000 species of plants, 80 percent of which are found nowhere else in the world. By 1990, more than two-thirds of the island's original forests were gone.

The Atlantic coast of Brazil, once covered with a million square miles of unique rain forest, is home to some of the most diverse and distinctive flora and fauna in the world, including the endangered golden-lion tamarin. Today, these forests have been reduced to less than 5 percent of their original cover.[1]

What is happening in Madagascar and Brazil is not unique. On every continent—from the rain forests of Mexico to the islands of Indonesia and the old-growth forests of the Pacific Northwest—people and nature are in conflict. More and more species are becoming threatened or extinct, and an increasing number of ecosystems are being damaged and fragmented. Growing human populations are struggling to meet their needs, while at the same time exerting increased pressure on nature. In addition, growing consumption habits, especially in developed countries like the United States and Japan, are intensifying the strain on global resources.

An Unprecedented Problem

The loss of biodiversity has been identified by experts, including the National Academy of Sciences[2] and the Science Advisory Board to the U.S. EPA,[3] as one of the most critical environmental problems facing the world. According to some estimates, we are currently losing one plant or animal species every 20 minutes worldwide—a rate that is expected to increase dramatically by the turn of the century. For example, the National Science Foundation task force on the biodiversity crisis reported that one quarter to one half of the Earth's species will become extinct in the next 30 years.[4] For each species that disappears, we are also losing unknown numbers of populations and unique gene pools. In addition, an increasing number of ecosystems around the world have been diminished to mere fragments.

Although extinction is a natural process, scientists think that we may be heading into an anthropocentric extinction spasm of unmatched proportion. Unlike the spasm that wiped out the dinosaurs, we are eliminating plants,

Biodiversity is the key to the maintenance of the world as we know it.

Edward O. Wilson
Biologist
Harvard University

[1] From *The Diversity of Life* by E. O. Wilson (Harvard University Press, 1992).
[2] From "The National Forum on Biodiversity" (1990, Washington, DC), cosponsored by the National Academy of Sciences and the Smithsonian Institution.
[3] From "Reducing Risk: Setting Priorities and Strategies for Environmental Protection," September 1990, Science Advisory Board to the U.S. Environmental Protection Agency.
[4] From *BioScience*, June 1990, page 418 (quoting *Science*, 16 Feb 90).

I believe that environmental education should be a required part of the middle and high school curricula. . . . If we don't begin in the schools we are missing a great opportunity to make an important impact on our future.

7th Grade Teacher
Rome, GA

The quotes from educators included throughout this report are taken verbatim from the surveys returned by teachers and nonformal educators. The comments are a representative sample of their concerns, interests, and frustrations, as well as their genuine commitment to helping students become environmentally literate. The comments also reflect a willingness on the part of formal and nonformal educators to work together to achieve similar goals.

insects, and other species at an unprecedented rate. At the same time, we're destroying huge areas of rain forests, wetlands, and coral reefs—ecosystems that, in previous die outs, served as the nurseries where life recovered. As conservationists Michael Soulé and B. A. Wilcox say, "Death is one thing; an end to birth is something else."

According to recent studies, however, most Americans are not even aware there is a problem with biodiversity and do not consider it a pressing environmental problem. In a 1992 national opinion survey conducted by Peter D. Hart Research Associates, only 1 percent of the people surveyed listed "endangered species" as a serious environmental problem, no one mentioned biodiversity loss as a problem, and only one in five (22%) said they had ever even heard of the "loss of biological diversity." However, when presented with "what scientists are saying" about the eventual results of biodiversity loss, most people surveyed expressed concern about the problem and 59 percent ranked biodiversity preservation at "8" or higher on a 10-point scale ("10" being extremely important). Furthermore, 92 percent of the respondents endorsed educating children about biodiversity.[5]

This lack of knowledge about the seriousness of the biodiversity problem—and the subsequent demonstration of caring when presented with even the most basic information—is one clear indication of the need for biodiversity education. The findings in this report reinforce the need for additional biodiversity education. As the following sections reveal, educators in schools and zoos, aquariums, museums, nature centers, and other nonformal institutions want more materials and training focusing on environmental education, and more specifically, biodiversity education. Educators in schools and nonformal institutions are also very interested in working together to enhance biodiversity education and provide stimulating educational experiences for students that extend beyond the classroom.

Windows on the Wild

Given the seriousness of biodiversity loss and the lack of public understanding and knowledge about it, World Wildlife Fund elected to launch a national biodiversity education program to help educate people about the causes behind the loss of biodiversity, the reasons it matters, and ways to address the problem. This program, called *Windows on the Wild*, is designed to use biodiversity as an organizing theme to:

- increase environmental literacy
- strengthen the links between formal and nonformal educators
- enhance biodiversity training for educators at formal and nonformal institutions

Windows materials and training will focus on a broad range of issues related to biodiversity, including the causes and consequences of the loss of species and ecosystems; the value of biodiversity (food, medicines, ecosystem services, etc.); how global environmental problems affect biodiversity; sustainable development and how it relates to biodiversity; the role of indigenous cultures in protecting species and habitats; the link between

[5]From "Highlights from a National Public Opinion Study on Biodiversity" conducted for Defenders of Wildlife, July 20, 1993, by Peter D. Hart Research Associates, Inc.

human population and loss of biodiversity; and the many economic and social issues related to biodiversity. In addition, this program will look at values and attitudes associated with biodiversity issues; how students can get involved in local, state, and national conservation activities; and how consumer choices and other actions in the United States contribute to the loss of biodiversity.

To help guide *Windows*, WWF assembled a national advisory board of outstanding teachers, environmental educators, zoo and aquarium educators, university professors, business leaders, conservation biologists, writers, evaluation specialists, and curriculum developers (see page 59). Based on the advice of the board and input from preliminary focus groups, WWF decided to focus initially on the middle school level. Many educators said they wanted specific materials for this age group and thought that most environmental education materials designed for K-8 or K-9 were either too unfocused or too elementary for middle school audiences. They also reinforced the fact that middle school curricula are more flexible than secondary curricula, which would allow for more innovation and possible integration of science with social studies, geography, language arts, and math.

In addition to working with schools, WWF is also pursuing partnerships with nonformal education institutions. Every year thousands of teachers and students visit these community educational facilities, and studies show that significant learning in both affective and cognitive domains occurs during these field trips (Disinger, 1987; Falk and Balling, 1982; Koran and Baker, 1978; Lisowski and Disinger, 1987). The clear advantage of nonformal institutions is that they can provide a unique learning experience that is stimulating, relevant, and very different from what can normally happen in a classroom setting. However, visits to nonformal institutions do have weaknesses. For example, most of these experiences are short term (e.g., usually one visit on one day) and prohibit ongoing follow-up. Schools, on the other hand, through well constructed curriculum programs and teacher training activities, can provide long-term reinforcement on a topic like biodiversity.

As WWF began to plan *Windows on the Wild*, it was confronted with these two promising yet distinct programming networks for youth education. WWF saw the potential benefits and advantages in working with both networks. Thus, instead of initially moving in one direction or the other, WWF decided to explore the biodiversity education interests and practices of each population along with the potential for relevant collaborative efforts between them.

A National Education Survey

To assess educators' needs, wants, and current practices related to biodiversity education, WWF conducted a national education survey in the spring and summer of 1993. In addition to surveying biodiversity needs and practices, this national assessment was designed to find out more about what teachers think about nonformal institutions and what nonformal institutions think about working with middle schools.

WWF developed and mailed two national education surveys: one targeted at middle school science and social studies teachers and the other targeted at

Curricula need to change enough to allow for a more in-depth instruction on biodiversity and environmental concerns or issues. Awareness is not enough. Taking an active part is more meaningful and lasting.

6-7th Grade Teacher
Rochester, NY

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A great deal of attention is given to concerns that are far away such as rain forest deforestation when we are having the same effect on biodiversity here due to wetland loss, forest fragmentation, stream sedimentation and pollution. Students should see the problems in their own backyard.

7-8th Grade Teacher
Hillsborough, NC

educators working in zoos, aquariums, nature centers, museums, and other nonformal education institutions. A total of 2081 teachers and 708 nonformal educators returned the surveys. In addition, WWF conducted several focus groups throughout the country with science and social studies teachers and nonformal educators.

This report includes a detailed summary of the results of the national needs assessment, including graphs and tables outlining how teachers and nonformal educators responded to survey questions. It also contains a section that focuses on the implications of the survey results for WWF's *Windows on the Wild* program and a draft strategic plan for *Windows*, with an overview of the *Windows* biodiversity educational framework, materials and training initiatives, and evaluation strategies.

More About World Wildlife Fund and Environmental Education

WWF works in more than 100 countries worldwide to preserve the abundance and diversity of life on Earth. WWF is action-oriented, supporting individuals and institutions that carry out practical, well-planned, and scientifically based conservation projects. It also seeks to strengthen conservation leadership and work with citizens of other countries to foster sustainable use of biological resources. WWF's work is shaped by an understanding that addressing human needs is the key to all successful long-term conservation efforts.

Windows on the Wild provides an opportunity for WWF to couple its scientific expertise, worldwide project-development experience, access to current research in biodiversity, and environmental education expertise to create a high quality, interdisciplinary biodiversity education program.

For more information about *Windows on the Wild*, please contact the Environmental Education Division of World Wildlife Fund, 1250 24th Street, NW, Washington, DC 20037.

Section 1: Key Findings

Before embarking on a national biodiversity education program, World Wildlife Fund decided it was critical to conduct a national needs assessment to determine if educators thought that such a program was needed, and if so, what type of program would be most effective. On the advice of its national advisory board, and with input from the University of Wisconsin, Stevens Point and support from Eastman Kodak Company, WWF conducted a three-part needs assessment that consisted of a series of focus groups, a literature search, and a national education survey that targeted middle school science and social studies teachers and educators working at nonformal institutions.

Prior to conducting a national education survey, WWF found limited data to clearly give direction to *Windows on the Wild.* Although recent surveys indicate that the public, and particularly students, are becoming increasingly concerned about the environment, it wasn't clear how that concern translated into an interest on the part of educators to incorporate environmental education into their teaching. Further, with respect to WWF's *Windows* environmental education program, there seemed to be scarce data or information on teacher understanding and interest in teaching about the more specific topic of biodiversity. Even among nonformal institutions that regularly conduct environmental and science education programs, there were few data indicating if, in fact, they are addressing or even interested in addressing the concept of biodiversity. In addition, there were limited data that indicated an interest in collaboration between middle schools and nonformal education institutions, specifically in working together to enhance biodiversity education.

The WWF/Kodak national education survey, summarized in this section, addressed the needs, interests, and current practices of both middle school educators and nonformal educators (working at zoos, aquariums, museums, nature centers, and other nonformal institutions) relating to environmental education and more specifically, biodiversity education. The survey also asked questions to determine what middle school teachers and nonformal educators thought about working together on the development of collaborative environmental education/biodiversity programs. The key findings, presented in this section, also corroborate what educators said during focus groups conducted in Washington, DC, Seattle, and Kansas City.

NOTE: WWF administered two surveys—one to middle school science and social studies teachers and one to nonformal educators working in zoos, museums, nature centers, and other nonformal institutions. This section summarizes the results of both surveys. For a breakdown of how educators responded to each survey question, please see page 35 for the results of the formal survey and page 43 for the results of the nonformal survey.

We teach life science, but we need to integrate environmental education so the students have a better concept of how it all fits together. . . . To find supplemental materials for the middle school student is very difficult and often times impossible.

7th Grade Teacher
Tecumseh, MI

The "Windows on the Wild" program sounds wonderful. The Erie Zoo education staff have been trying to become more involved in educating middle school students. . . . So often we hear from teachers and principals that the zoo is not appropriate for students after grade three. We are trying to change this and are already making some headway.

Zoo Educator
Erie, PA

Educators Rate Environmental Education a Top Priority

Teachers responding to the survey, in general, showed a substantial interest in supporting environmental education and incorporating it into their teaching. Fully 97 percent (Fig. 1) of the middle school teachers surveyed indicated they agreed or strongly agreed that environmental education should "be an important part of the total school curriculum." Similarly, nearly 98 percent agreed that they should include environmental education in their own teaching (Fig. 2).

The survey also asked middle school teachers and nonformal educators to indicate their understanding of and support for teaching about biodiversity. Each survey included the following brief definition of biodiversity and overview of what a biodiversity education program might include:

> "**Biodiversity** refers to the variety of life on Earth. It is a contraction of biological diversity and includes genetic diversity, species diversity, and ecosystem diversity."

Figure 1: Environmental education (EE) should be an important part of the total school curriculum. (N=2050 teachers)

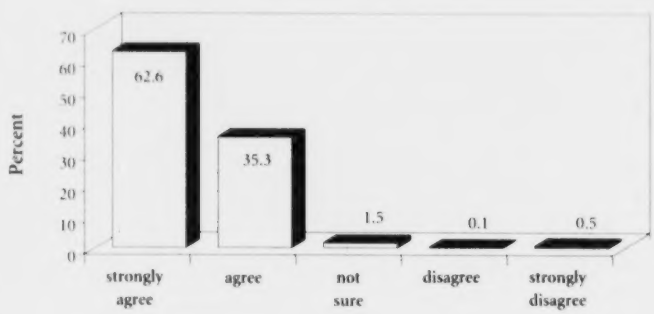
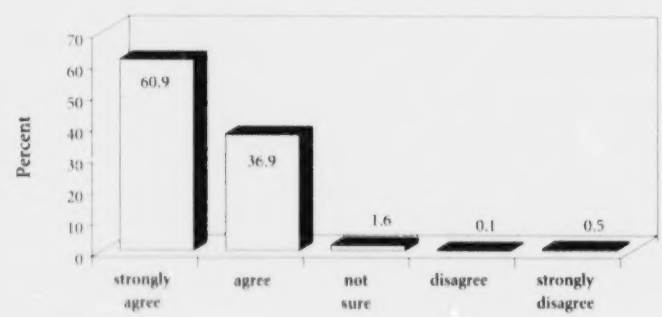


Figure 2: It is important to include EE in my own teaching. (N=2048 teachers)



"A **Biodiversity Education Program** can help students become knowledgeable about issues related to biodiversity and help them develop the commitment and skills to maintain or enhance biodiversity at local, regional, or global levels. Here are a few of the topics that might be included in a biodiversity education program:

- causes and consequences of loss of species and habitats
- the value of biodiversity (food, medicine, and so on)
- how environmental problems such as global climate change and pollution affect biodiversity
- sustainable development and how it relates to biodiversity
- role of indigenous cultures
- the link between population issues and biodiversity
- the connection between biodiversity and economic issues
- how your students can get involved in biodiversity issues"

After reading the synopsis and definition, educators responded to questions focusing on their understanding of biodiversity and their interest in teaching about it. Most teachers thought they understood the concept of biodiversity and expressed substantial support for practicing biodiversity education (Figs. 3-4).

Figure 3: I understand the concept of biodiversity. (N=2051 teachers)

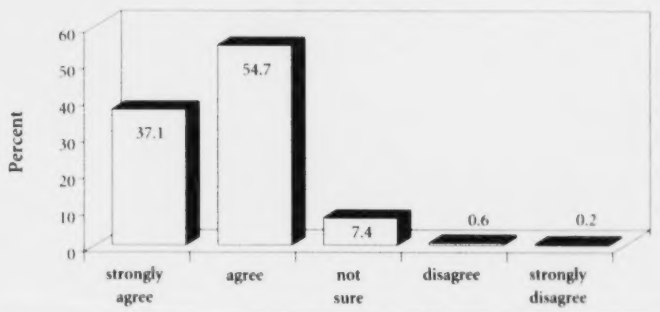
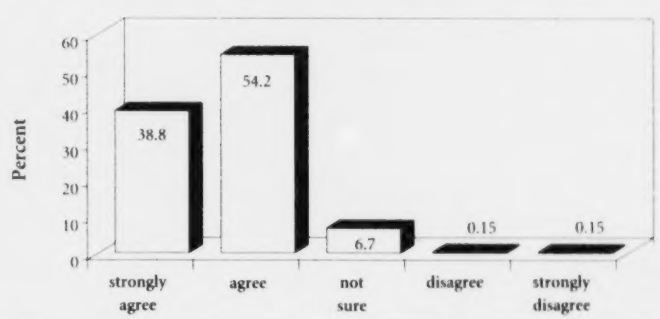


Figure 4: Teaching about biodiversity should be an important part of the school curriculum. (N=2047 teachers)



Anything you are able to do to push these issues (biodiversity) will help. There is very little understanding of what stake we all have in the fate of other species.

7th Grade Teacher
Flossmoor, IL

Creating opportunities for students to examine natural habitats, to bring what they're learning in science and social studies classes outdoors, applies classroom learning to life. Children get to draw new insights about their environment and about how the things they're learning in school can help them understand more about the diversity in their world.

Naturalist-Educator
Montrose, WV

Similarly, nonformal educators thought they understood the concept of biodiversity, and a strong majority believed biodiversity education should be an important part of their institution's environmental education program (Figs. 5-6).

Figure 5: Our educational staff understands the concept of biodiversity and related issues. (N=685 nonformal educators)

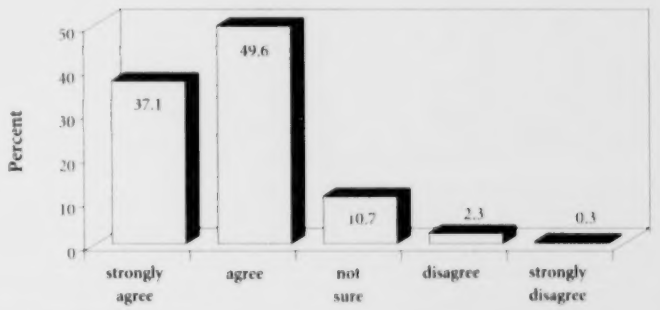
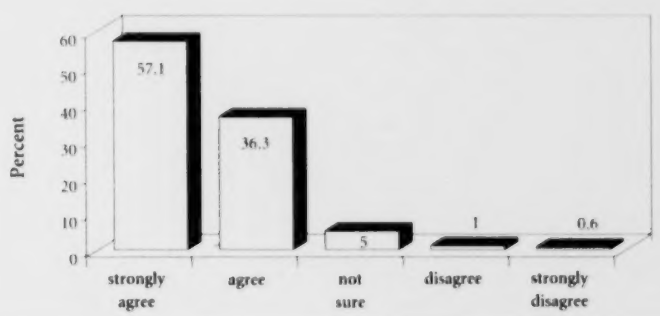


Figure 6: Biodiversity education should be an important part of our institution's EE program. (N=694 nonformal educators)



Support for Environmental/Biodiversity Education Is Not Always Translated into Practice

Although the survey reveals substantial support for environmental education and biodiversity education, in contrast, there seem to be limited time and attention being devoted to these concepts in both planning and practices. Over 86 percent of the teachers responding spend only an hour or less per week teaching about the environment (Fig. 8). And approximately 82 percent of the teachers responding suggested either their school district did not have, or they were unaware if it had, an environmental education curriculum plan (Fig. 7).

Figure 7: Does your school district have a written EE curriculum plan? (N=2015 teachers)

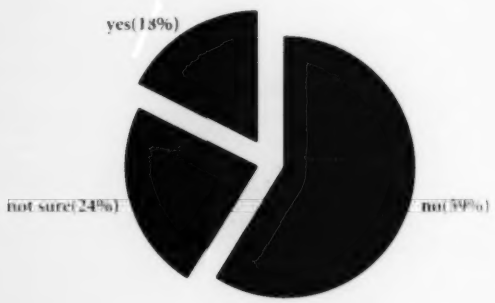
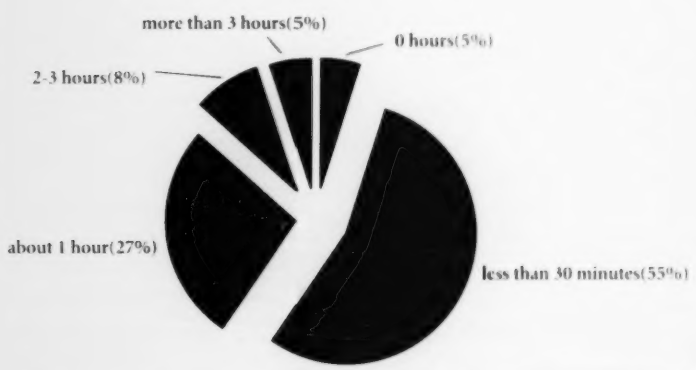


Figure 8: Approximately how much time each week do you spend teaching about the environment? (N=1924 teachers)



I feel this is an important part of the social studies curriculum that is too often left for science teachers to address.

7th Grade Teacher
Springfield, OH

Congratulations on pursuing combinations of resources to implement these programs. We are not all experts and need support and input from many sources.

Botanical Garden Educator
Richmond, VA

While nonformal institutions seem to be directing increased efforts toward environmental education, they too are falling short in meeting their desired goals. In general, nonformal institutions address environmental education or biodiversity education through student programs or indirectly through related teacher education/workshop programs and adult education programs. And although 61.6 percent of the facilities surveyed offer general environmental education programs for middle school students (Fig. 9), 89 percent agree or strongly agree it is important to provide more programs for these students (Fig. 10).

Figure 9: Does your institution provide scheduled EE programs for middle school students? (N=670 nonformal educators)

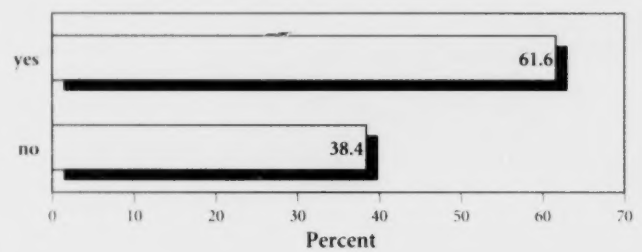
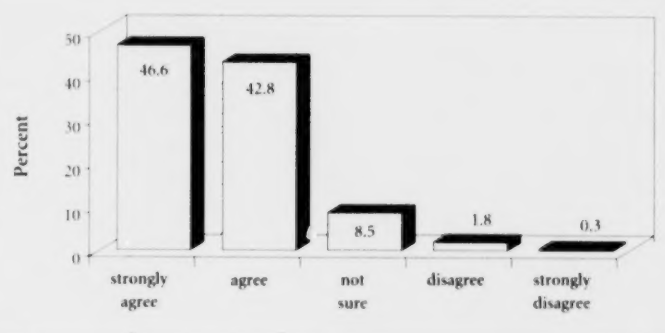


Figure 10: Our institution believes it is important to provide more EE programs for middle school students. (N=670 nonformal educators)



In general, nonformal educators did identify school groups as a distinct client group (Fig. 11). They also indicated that school groups are the largest audience for their institutions' education programs (Fig. 12), making up almost half the participants in educational programming. In fact, the majority of respondents targeted 41 percent or more of their education programs for school audiences (Fig. 13). The largest category of school audiences was clearly grades K-5 (Fig. 14).

Figure 11: What percentage of your total visitation is made up of school groups? (N=679 nonformal educators)

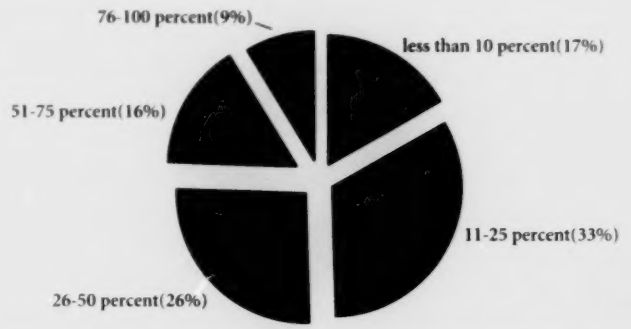


Figure 12: Which audience makes up the largest percentage of your educational programs that last at least one hour? (N=1311 nonformal educators)

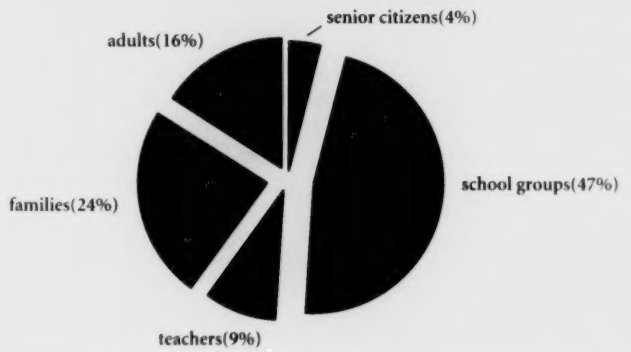
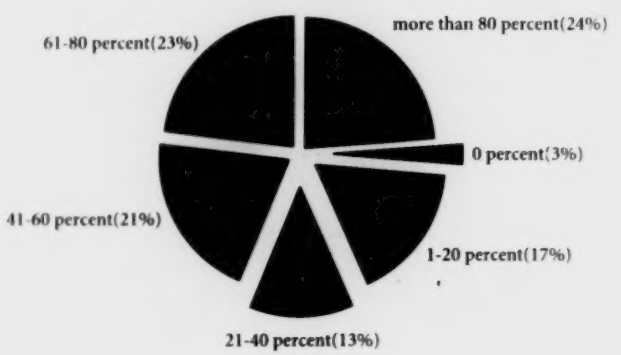


Figure 13: What percentage of your scheduled educational programs are targeted for school groups? (N=672 nonformal educators)



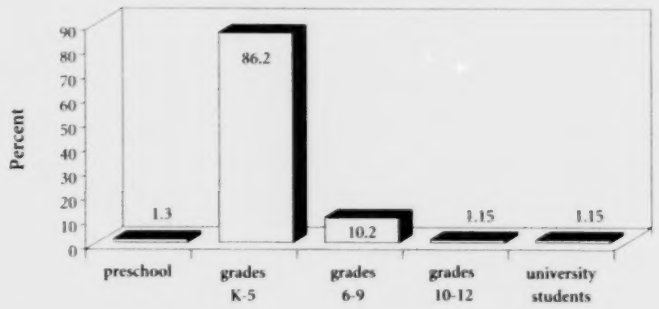
I find it wonderful that you are focusing your attention on the education system. So many times we are only criticized for not keeping up. Not many organizations ask what we need. They only try to tell us what we don't have.

7th Grade Teacher
Granite Falls, NC

So much has been done on endangered wildlife, but the plant kingdom is often not emphasized. . . . I realize that to most, plants aren't as interesting as animals, but we must find a way to turn kids on to just how neat plants truly are—the life of our planet depends on it.

Botanical Garden Educator
Atlanta, GA

Figure 14: Which represents your largest school audience? (N=669 nonformal educators)



When considering biodiversity education, it was clear that nonformal institutions offer a limited number of programs specifically related to biodiversity, and the majority of biodiversity programs offered were included as part of a larger program (Fig. 15). A similar trend is obvious in the responses to the teacher workshops offered on biodiversity (Fig. 16).

Figure 15: To what extent does your institution provide scheduled education programs for middle school students addressing biodiversity? (N=620 nonformal educators)

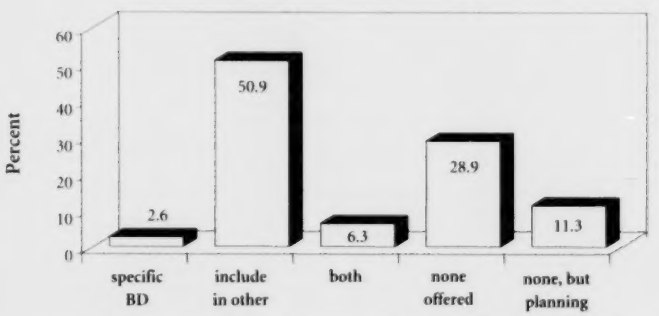
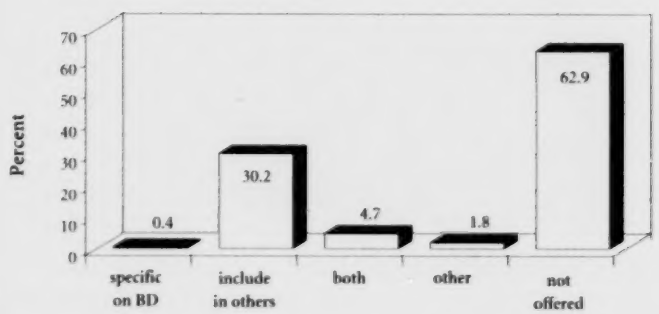


Figure 16: Which best describes the types of biodiversity-related workshops that you offer for teachers? (N=708 nonformal educators)



Nonformal Educators and Middle School Teachers Want To Collaborate

Nonformal institutions have the ability to play an extremely important role in environmental education because they can provide unique learning experiences for both middle school students and teachers. By offering stimulating, hands-on programs, these institutions can get students and teachers excited about a particular topic or concept in a way that's difficult to replicate in a classroom. Thus, the WWF/Kodak surveys sought to explore the current status of collaboration between these formal and nonformal institutions and to determine if there was mutual interest in working together to address the concept of biodiversity education.

The majority of teachers that responded (Fig. 17) believe that nonformal institutions enhance environmental education efforts in their community. However, most of those who use these nonformal institutions take their students on only one to two field trips per year (Fig. 18).

Many students have heard about environmental issues, but that's the extent of their knowledge. Students need to learn what the issues are and what they can do to help.

7th Grade Teacher
El Sobrante, CA

Figure 17: Nonformal institutions in my community enhance EE efforts for middle school students and educators. (N=2016 teachers)

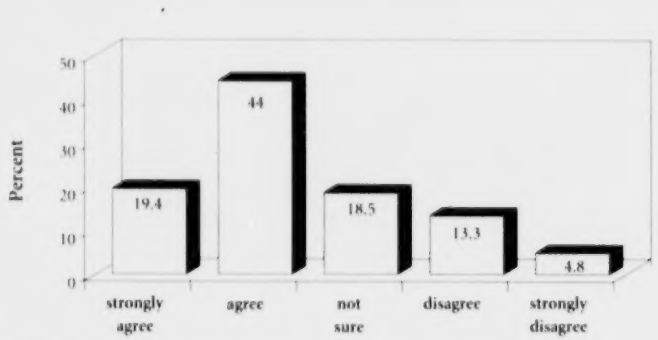
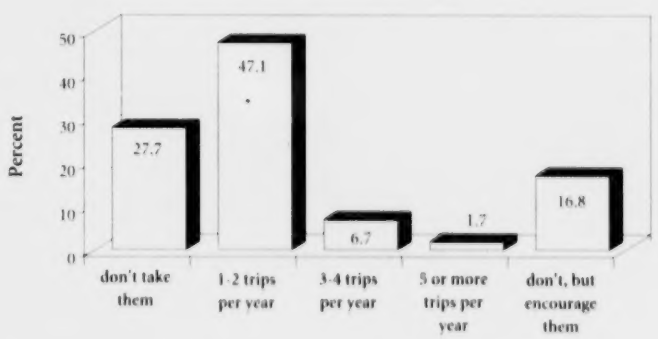


Figure 18: How often do you take your students to nonformal education institutions? (N=2026 teachers)



The role of indigenous cultures and the link between human population and biodiversity are the issues of greatest importance to this museum.

Museum Educator
Ukiah, CA

Teachers suggested they use field trips for both enhancement of specific topics covered in class or for general enrichment (Fig. 19). The nonformal institutions are, however, not perceived as being active in providing programs at the schools (Fig. 20). Yet, as depicted in Figure 21, teachers perceive school visits as a desirable approach for biodiversity education.

Figure 19: Which of the following best describes your use of nonformal institutions? (N=2081 teachers)

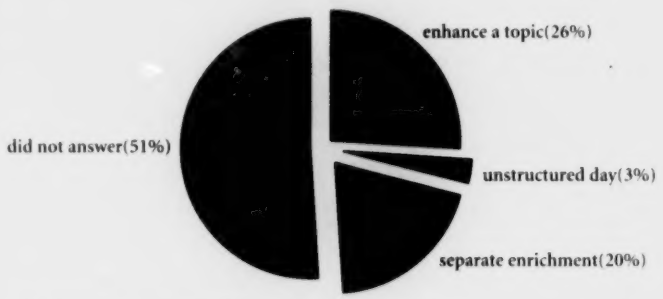


Figure 20: To what extent do nonformal institutions come to your school to present classes or programs to your students? (N=2027 teachers)

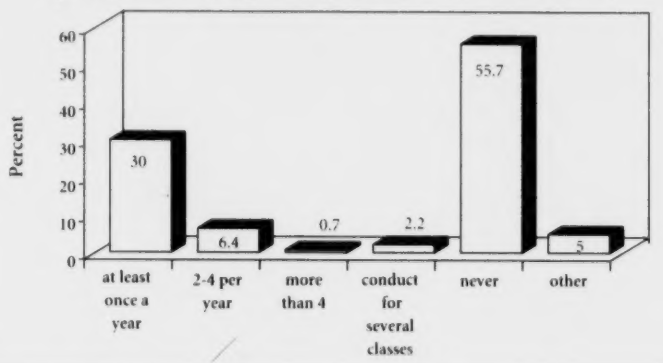
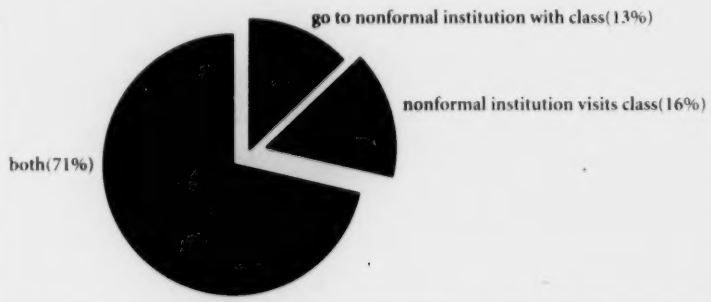


Figure 21: If nonformal facilities were to offer additional programs about biodiversity, which would you prefer? (N=1994 teachers)



Close to half of the teachers responding (Fig. 22) use educational materials developed by nonformal institutions. However, as Figure 23 indicates, many teachers who use nonformal institutions develop their own pre- and post-visit activities.

Figure 22: In your classroom, do you use educational materials that were developed by local nonformal institutions? (N=2006 teachers)

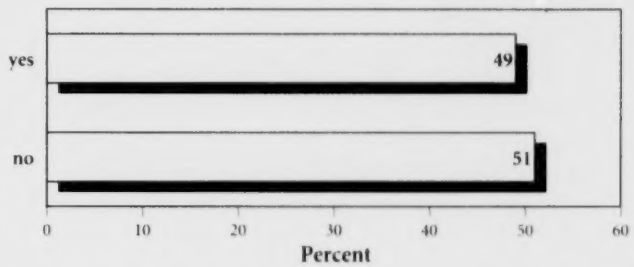
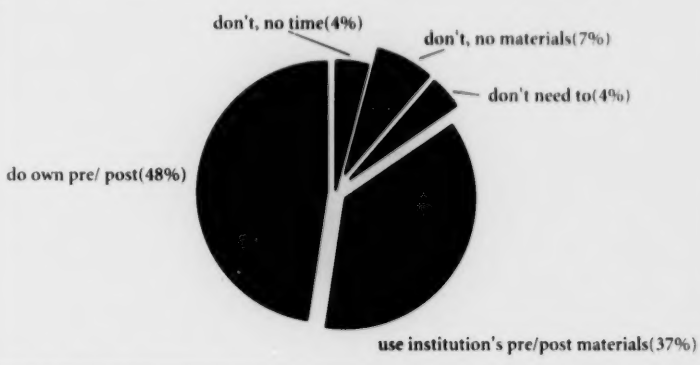


Figure 23: Which best describes your feelings about conducting lessons before or after visiting a nonformal institutions? (N=1017 teachers)

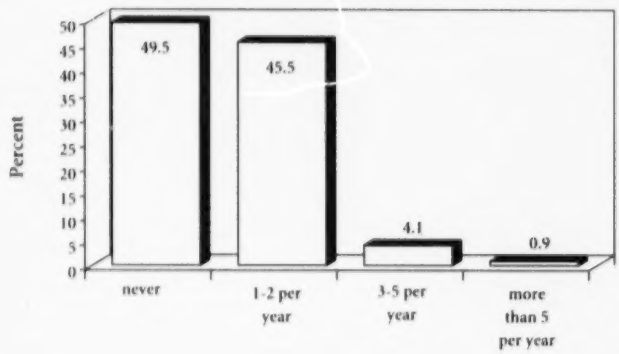


Many parents are still in the dark when it comes to environmental awareness. I would like to get students involved with projects that allow them to be involved with their families. The students can actually teach their parents if we can get the family involved.

8th Grade Teacher
Raleigh, NC

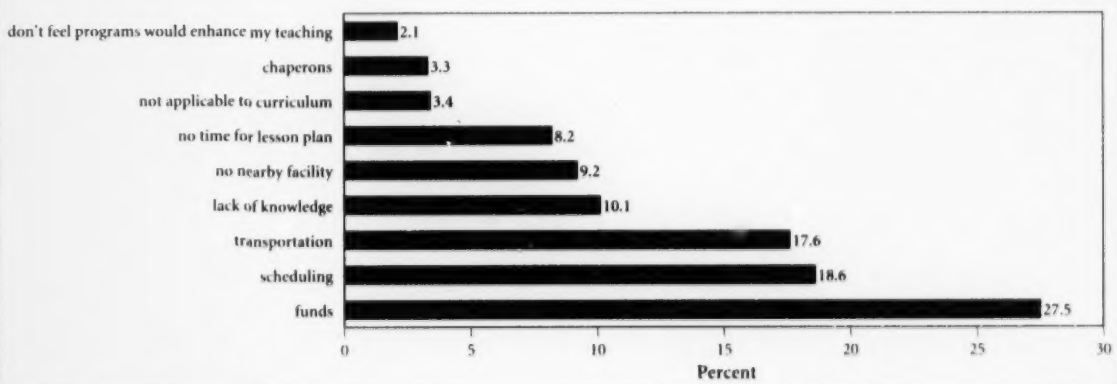
Many of the teachers also perceived nonformal institutions as a source for continuing their own professional development. About half of the respondents who take their students to nonformal institutions have also been involved in some teacher workshops at nonformal institutions (Fig. 24).

Figure 24: How often do you attend teacher workshops at these non-formal institutions? (N=1069 teachers)



Finally, teachers were asked to identify the barriers they thought most prevented them from increasing their use of nonformal institutions. As Figure 25 indicates, most identified funds, transportation, and scheduling as the top three barriers.

Figure 25: What are the most serious barriers to increasing your use of nonformal institutions? (N=5691 teachers) (Results of questions 9, 10, and 11 in Section C of the teacher survey.)



Educators Need and Want More Materials and Training Focused on Biodiversity

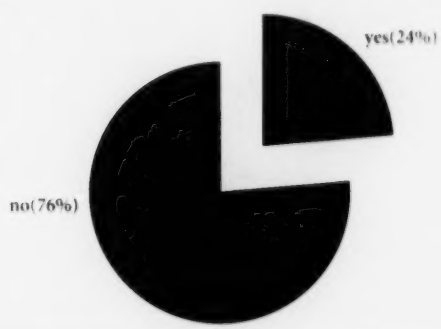
As the survey results indicate, both middle school teachers and nonformal educators strongly support environmental education and biodiversity education. They also agree that working together more would benefit both students and educators. However, both teachers and nonformal educators identified barriers—from limited budgets to lack of time—that prevent them from conducting more biodiversity education programs and constrain their ability to collaborate.

In addition to assessing what educators think about biodiversity education and working together, the WWF/Kodak survey was also designed to find out how to overcome the barriers identified. Specifically, WWF wanted to find out what type of incentives (materials and programs) could help encourage more collaboration between schools and nonformal institutions and increase the quality and quantity of programs focusing on biodiversity.

What Teachers Say

Only about 24 percent of the respondents to the teacher survey (Fig. 26) indicated that they had any pre-service training in environmental education. And only about half (Fig. 27) said they had been involved in some type of environmental education in-service or post-graduate training. So it's not surprising that over 90 percent of the teachers in this survey identified a need for teacher workshops to help students become more literate about biodiversity (Fig. 28).

Figure 26: Did you receive pre-service training specifically in EE? (N=1967 teachers)



Young people aren't stupid. Give them the facts and they'll decide. Nature is awesome. We don't need anymore "say goodbye" dramatizations.

9th Grade Teacher
Storm Lake, IA

I believe that teaching the value of human life and ecology are the most important weapons to battle the destruction of our planet. Showing the children that they do play an important part in the chain of life and that they can make decisions that help the environment would be very helpful. Empowering them with knowledge, values, and problem-solving skills is our hope for the future.

Museum Educator
Clarksville, TN

Figure 27: Have you received in-service training or taken any post-graduate courses in EE? (N=2070 teachers)

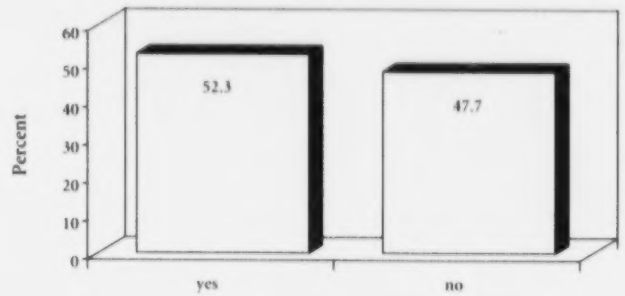
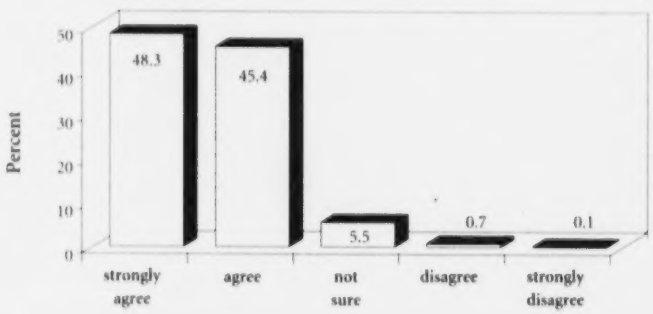


Figure 28: A need exists for teacher workshops . . . to help students become literate about biodiversity. (N=2048 teachers)



Teachers were also very interested in the availability of biodiversity resources. The majority of teachers responding to the survey identified a need for materials that would help middle school students become literate about biodiversity (Fig. 29). In fact, the respondents identified the lack of resources as the single major barrier to conducting more biodiversity education in their classrooms (Fig. 30).

Figure 29: A need exists for educational resources designed to help middle school students become literate about biodiversity. (N=2048 teachers)

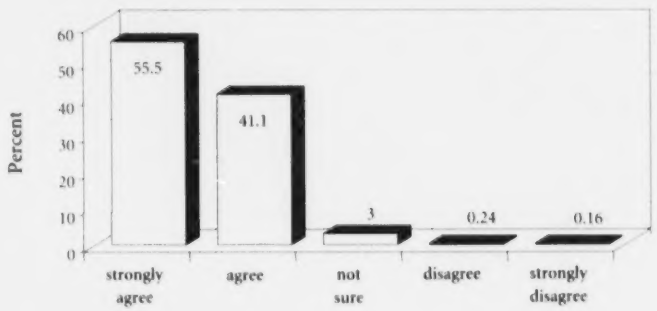
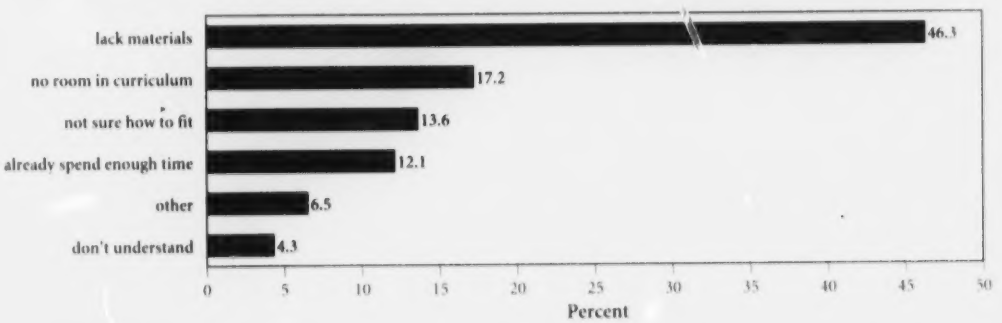
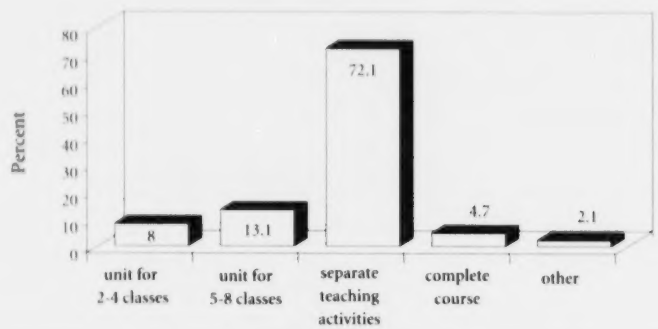


Figure 30: What is the most serious barrier to increasing your teaching of biodiversity? (N=1820 teachers)



Although teachers were interested in a wide range of biodiversity education materials, they had definite preferences. A wide majority indicated they would prefer resources that provide separate teaching activities rather than progressive units or complete courses (Fig. 31) .

Figure 31: If WWF produced educational curriculum materials focusing on biodiversity, which would you prefer? (N=1902 teachers)



When asked to rank order the types of resources they preferred, teachers' top three preferences were (1) articles and information booklets for students; (2) audiovisual resources, primarily videos; and (3) self-instructional activities, games, and workbooks (Figs. 32-33). (Note: In focus groups many educators indicated an interest in having resources that could serve both needs by having activities and background information that could stand alone or be incorporated into a progressive unit.)

Figure 32: Which resource listed below would you find most helpful in enhancing your efforts to teach about biodiversity? (N=6243 teachers) (Results of questions 9, 10, and 11 in Section B of the teacher survey.)

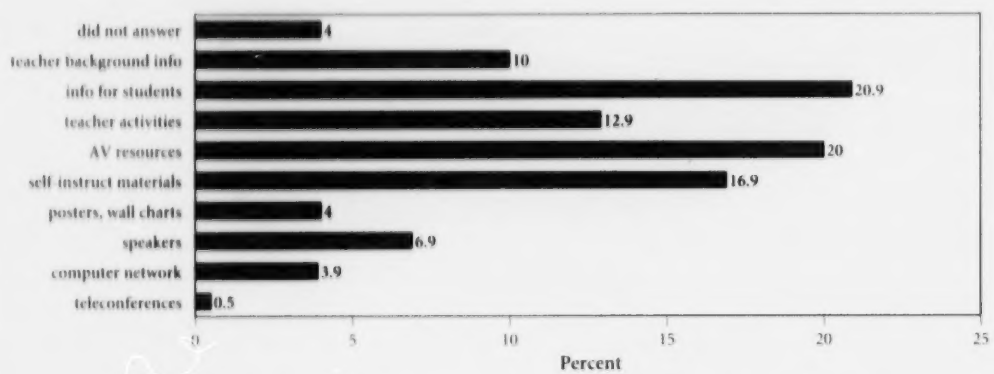
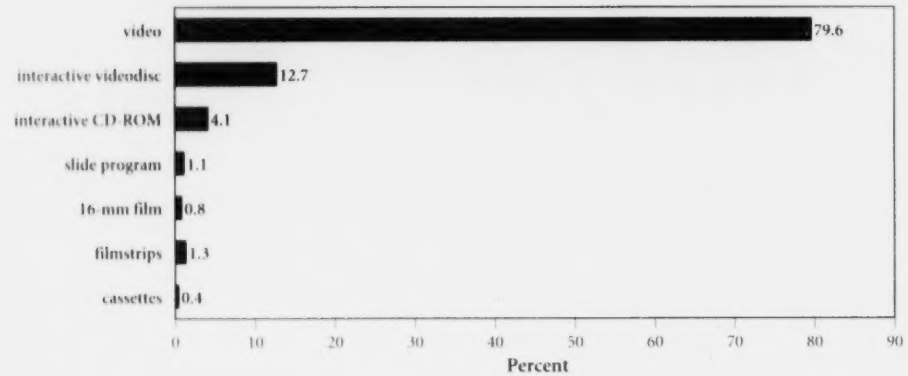


Figure 33: If WWF developed one type of AV program focusing on biodiversity, which would be most useful to you? (N=1993 teachers)

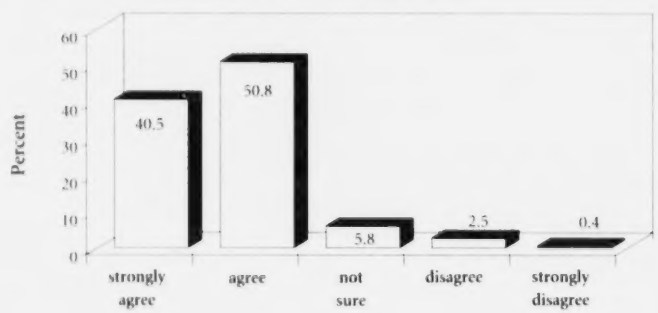


What Nonformal Educators Say

As shown earlier (Fig. 6), the majority of respondents from nonformal institutions thought that biodiversity education should be an important part of their institutions' environmental education programs. They also suggested a number of strategies that would help enhance biodiversity education efforts at their various institutions.

A large majority of nonformal educators believed that staff at their institutions could use additional training in conducting educational programs for middle school teachers about biodiversity (Fig. 34).

Figure 34: Our education staff could use additional training to conduct education programs for middle school teachers about biodiversity. (N=691 nonformal educators)



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In fact, on the average, they identified help in developing teacher training programs as a major priority relative to other considerations. And similar to the teachers' preferences, they indicated that their first priority for education materials would be activity guides followed by self-directed materials for students (Figs. 35-36).

Figure 35: To help link biodiversity programs at your institution and middle school teachers and students, which would be most important? (N=2003 nonformal educators)

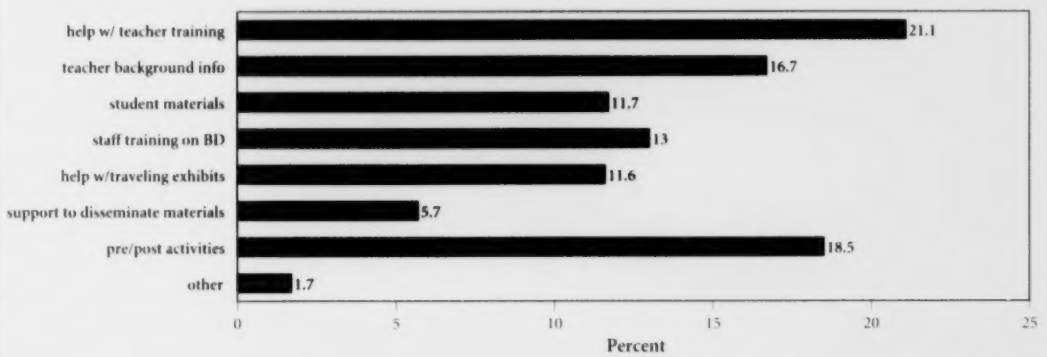
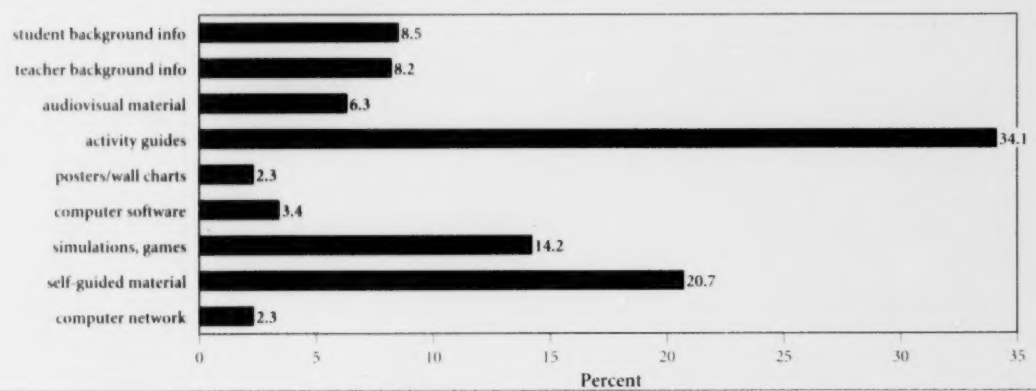


Figure 36: Which of the following teaching materials do you think would be most effective for biodiversity education at your institution? (N=684 nonformal educators)



Section 2: Implications for Windows on the Wild

This report represents the completion of the first phase of WWF's *Windows on the Wild* program: the needs assessment and program design phase. In addition to the national survey results summarized in this report, we have conducted several focus groups across the country made up of science and social studies teachers and administrators, educators from nonformal institutions, and middle school students. We also commissioned Peter D. Hart Research Associates to conduct an assessment of what young people think about the environment (see reference on page 29), and worked with the University of Wisconsin at Stevens Point to conduct a literature search looking at biodiversity education, environmental education programs at nonformal institutions, and middle school use of nonformal institutions.

Most environmental education programs are too elementary and don't hold the interest of, or challenge, middle school students.

7th Grade Teacher
Lawrenceville, GA

Conclusions

Given the results of our initial research and planning, we have reached the following conclusions about *Windows on the Wild*, biodiversity education, and the role WWF can play to enhance national environmental education activities.

Generally . . .

- Environmental education, and specifically biodiversity education, is strongly supported by both middle school and nonformal educators.
- *Windows on the Wild* would fill a needed niche in national environmental education programming because biodiversity education is currently not addressed as a distinct education program in the nation's schools.
- Young people believe that protecting the environment is one of the most important issues for the United States to address in the year 2000.
- Although young people are keenly aware that the world faces serious environmental problems, their understanding of ecological issues is fairly limited.
- The public has limited understanding of biodiversity issues.

About Biodiversity Education in Middle Schools . . .

- Since a majority of school districts lack environmental education curriculum plans (over 75 percent of the teachers indicated either none

In our curriculum, as with most, there is little emphasis on the issues surrounding our world and the environment. Time constraints and the tremendous amount of material that teachers are expected to teach leave little time to develop, implement, and adequately address this issue.

7-9th Grade Teacher
Washington, DC

existed or they weren't sure), WWF could encourage them to develop and implement such plans (with possible incentives)—resulting in increased attention to both environmental and biodiversity education.

• Because only a limited number of teachers have had environmental education pre-service or in-service training, and a majority have expressed a need for teacher workshops, WWF could support the development and offering of such programs.

• Teachers have requested environmental education "activity guides" for their use and materials to be used directly by students—especially background information, videos, and self-instructional materials.

About Biodiversity Education in Nonformal Institutions . . .

• Such institutions strongly support initiating, improving, and offering biodiversity education at their facilities.

• WWF could assist such institutions through provision of in-service training, activity guides, and relevant background information for clientele use.

About Joint Biodiversity Education Programs between Middle Schools and Nonformal Institutions . . .

• Middle school teachers would welcome nonformal institutions providing on-site or in-school visits and teacher training workshops or classes related to biodiversity education.

• Lack of funding, transportation, and scheduling problems are barriers to increasing or maintaining current use of nonformal institutions by middle school teachers.

• Nonformal institutions identify student groups as a primary clientele, and a majority of their biodiversity education programs are directed at K-5. However, most expressed an interest in reaching more middle school audiences.

• Though a majority of teachers and nonformal institutions favor collaborative biodiversity education programs, both groups also have biodiversity education needs and interests that must be addressed independently.

What's Next?

Given what we've learned in our needs assessment, the next phase of *Windows* will include the development and piloting of materials and training programs focused on biodiversity. We also hope to fund innovation grants in pilot communities to take the national materials and use them to develop local programs that help link schools and nonformal educational institutions and help increase environmental literacy of middle school students. Throughout the program, we intend to measure our success by pilot testing all materials with students, teachers, and nonformal educators and conducting qualitative and quantitative evaluations of the program.

Here's a more detailed look at what's already in progress for the next phase of *Windows* and what we have planned:

Educational Framework and Guiding Principles

In addition to conducting the national education survey, WWF, with input from the advisory board, has developed a draft education framework for *Windows*. The framework identifies key concepts, biodiversity issues, actions and skills, and sample experiences that will form the foundation of this program. A copy of the draft framework is included on pages 55-58.

Working with our advisory board, we also developed a general set of guidelines for *Windows* that includes student-centered learning that emphasizes critical and creative thinking skills, cooperative learning, interdisciplinary education, and hands-on experiences. In addition, the program will receive close scientific scrutiny from WWF scientists and other experts in the field to ensure that all the materials are scientifically accurate. We will also be working with education specialists to make sure that our materials and training programs are designed and implemented to effectively reach diverse audiences throughout the country.

Materials and Training

As the core of *Windows*, WWF will be developing a variety of exemplary materials and training programs focused on biodiversity and filling needs identified by the educational community. One of the first products will be a creative, magazine-style primer for middle school students focusing on biodiversity. The full-color primer will include fiction and nonfiction stories and articles that reinforce concepts in the biodiversity education framework. This primer, which will be piloted in key sites across the country, will also be used throughout the program to promote science, geography, history, and language arts.

WWF is also planning to create a series of modules for middle school teachers and nonformal educators that focus on a broad topic, such as sustainable development. Each module will use a case-study and community-investigation approach that examines a current project and includes real data. The modules will also include an action component that encourages students to select a community problem related to some aspect of the module and design their own investigation. As much as possible, the modules will use already existing materials, such as activities from *NatureScope*, Project Learning Tree, and Project WILD, to help teach important concepts.

Another critical aspect of the program is teacher training and the design and implementation of "training of trainers" (TOT) workshops. WWF plans to develop and implement a biodiversity workshop model that trains trainers so that they can conduct workshops that increase teachers' knowledge of biodiversity issues. The workshops will use materials developed as part of *Windows*, including the modules and the biodiversity primer, and will be designed to help increase teachers' knowledge of biodiversity issues and provide them with the skills to incoporate biodiversity into their teaching strategies.

WWF is also working with nonformal institutions around the country to develop pilot programs that bridge the gaps between nonformal and formal educational institutions. Two of the pilots in progress include a photo and essay contest for Atlanta students, using biodiversity as the theme, and a guide for teachers in the Seattle area about local environmental educational opportunities.

At one time there was a great push in this area in the schools. All the other problems the schools must deal with these days have taken a front seat. Environmental concerns must be again addressed in the schools... I believe in environmental education but do not have the time to hunt down materials to teach it like I should.

7th Grade Teacher
White Salmon, WA

We need to teach our kids to critically examine biodiversity issues and see how they contribute to the problems. . . . but most important, we need to get them to care . . . because these are issues that they will be dealing with for the rest of their lives.

8th Grade Teacher
Seattle, WA

Evaluation

Evaluation of *Windows on the Wild* will occur throughout the life of the program. WWF intends to conduct an ongoing formative evaluation that will include pilot testing of all student and teacher materials; a biodiversity literacy tool that will be used to conduct pre- and post-tests with students to evalaute knowledge, skills, and attitude changes that occur as a result of the *Windows* program; and evaluation of TOT workshops. WWF also plans to complete a summative evaluation at the end of the project and publish a written report of our findings.

In addition, WWF will be developing a comprehensive strategy for reaching urban and culturally diverse audiences effectively with *Windows* materials and training programs. This strategy will include a pilot study that looks at the language, reading, and cultural barriers that have traditionally prevented some students from benefiting from environmental education programs.

Working closely with the program designers, the evaluation team will also develop learner outcomes for each module, objectives for each activity in the modules, and suggested authentic assessment measures for each module and unit. In addition, evaluators will strive to tie these learner outcomes to the national standards that are currently being developed for science, math, geography, history, and language arts.

If you would like to be placed on the mailing list to receive updates about *Windows on the Wild* or are interested in taking part in piloting new materials, please write to World Wildlife Fund, Environmental Education Division, 1250 24th Street, NW, Washington, DC 20037.

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I need materials! I'm overwhelmed by regular duties and am unable to devote the necessary time to develop an environmental ed curriculum

7-8th Grade Teacher
Vacaville, CA

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We need more hands-on opportunities for this age group. Our district has an environmental studies camp and many science lessons for elementary and high school, but it disappears for middle school. . . .

7-8th Grade Teacher
Seattle, WA

The more you become involved with the schools, the more you will touch the future.

8th Grade Teacher
Canyon Country, CA

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Appendix 2: Survey Methodology

Description of the Samples and Return Rates

Two national samples provided the results found in this report. One sample included 13,031 teachers. The other sample included 2,531 nonformal educators from zoos, aquariums, nature centers, museums, science centers, and botanical gardens.

The Teacher Survey

To select the recipients for the teacher survey, samples were computer generated by Market Data Retrieval, Inc. (1993). First, a national random sample of 10,147 science and social science teachers from grades 6-9 was selected. A second urban sample of 2,884 science and social studies teachers from grades 6-9 was also selected. This second sample related to potential urban pilot sites for the *Windows on the Wild* program and included Chicago, Seattle, Atlanta, Rochester, and Washington, DC. All surveys were mailed to teachers (by name), not to schools or principals.

The random sample had a return rate of 1,652 and the urban sample resulted in a return of 429 surveys. Analysis indicated no significant differences between urban and rural populations relative to their support for environmental education or biodiversity education. Thus, the two samples (i.e., national random and pilot sites) were maintained as one collapsed sample. Ultimately, a total of 2,081 teachers responded, which resulted in a response rate of about 16 percent.

The Nonformal Educators Survey

The nonformal sample included a total mailing of 2,531 surveys. This mailing included all relevant names and addresses obtained from the American Association of Zoological Parks and Aquariums (N=173), Society for Environmental Education (N=612), American Association of Museums (N=1011), Association of Science and Technology Centers (N=394), and the American Association of Botanical Gardens and Arboretums (N=341). Respondents from the various lists were collapsed and treated as one sample under the umbrella title of nonformal educators. A total of 708 surveys was returned. This was a response rate of approximately 28 percent.

Survey Analysis

The computer software program SPSS for Windows (1993) was used to conduct the statistical analysis and generate the graphs and tables that appear in Section 1 of this report. Descriptive statistics were determined for all appropriate questions and are reported in appendices 3 and 4. Select

Students often have absolutely no background in anything that deals with the environment. My students are from the inner city and often do not even know what we mean by 'environment.'

6th Grade Teacher
Pittsburgh, PA

Please be sure to take into account the needs and special situations of urban and culturally diverse children in preparing your materials.

Botanic Garden Educator
Brooklyn, NY

statistics and results were discussed in Section 1 of this document.

Correlational statistics were run to explore the possibility of relationships between certain variables in the surveys. However, when working with a large number of responses (N>600) it is possible to find statistically weak correlations that may not give a credible indication of relationships. Thus, an r-value of .30 or greater was considered practically significant for this survey. At the r=.30 value, no correlations obtained in this study were considered significant. (For a copy of the correlations, please write to Karen Keagle, WWF, 1250 24th Street, NW, Washington, DC 20037.)

The number of respondents to a given question may vary from the total returns of each survey (i.e., 2,081 and 708, respectively). The variance occurs primarily as a result of incomplete responses. Also, if people provided multiple responses to questions that required one response, it was considered missing data. In some cases, large numbers of missing data may be due to respondents not answering questions that they did not think were pertinent to their situation. In several cases, respondents were asked to skip questions that did not pertain to them.

Survey Development

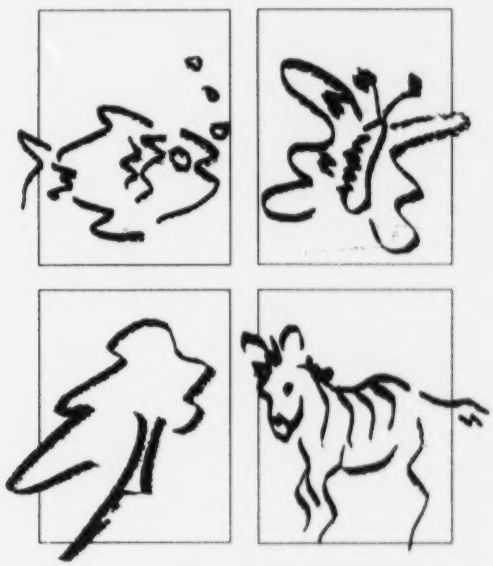
A set of survey objectives was established relative to each of the respondent populations (i.e., teachers and nonformal educators). The objectives were then used to draft survey questions. Focus groups, representing each population, critiqued the draft questions and offered suggestions for revision. The questions were revised and arranged into draft survey instruments, which were piloted with sample populations. Based on results from the pilots, appropriate revisions were made and the final instruments were published.

Survey Administration

All surveys were sent out by mail in a kit that included the survey, a poster, an activity guide, and a cover letter from Kathryn Fuller, the president of World Wildlife Fund. The cover letter explained that all respondents who returned their surveys by the deadline would receive a copy of the *Windows on the Wild* biodiversity primer and had the option of receiving a copy of the survey results. A follow-up postcard was mailed to each recipient approximately two weeks after the initial mailing.

Appendix 3

WINDOWS ON THE WILD℠



Teacher Education Survey and Results

This survey was developed by World Wildlife Fund and the University of Wisconsin-Stevens Point, Center for Environmental Education, with support from Eastman Kodak Company.

Printed on Recycled Paper

section A GENERAL INFORMATION

The purpose of this section is to find out general information about your teaching situation.

1. Which of the following best describes the community where most of your students live? (Valid N=2026; Missing=55; Total=2081)
   a. rural 621 (30.7%)
   b. suburban 654 (32.3%)
   c. small to medium urban area (less than 100,000) 430 (21.2%)
   d. large urban (more than 100,000) 321 (15.8%)

2. In total, how many years have you been teaching? (N=2076; M=5; T=2081)
   a. 1-2 years 142 (6.8%)
   b. 3-5 years 280 (13.5%)
   c. 6-10 years 327 (15.8%)
   d. 11-15 years 301 (14.5%)
   e. 16-20 years 352 (17.0%)
   f. more than 20 years 674 (32.5%)

3. What is your gender? (N=2074; M=7; T=2081)
   a. male 753 (36.3%)
   b. female 1321 (63.7%)

4. Did you receive pre-service training specifically in environmental education? (N=1967; M=114; T=2081)
   a. yes 467 (23.7%)
   b. no 1500 (76.3%)

5. Have you received in-service training or taken any post-graduate courses in environmental education? (N=2070; M=11; T=2081)
   a. yes 1082 (52.3%)
   b. no 988 (47.7%)

6. Which subjects do you teach? (N=2048; M=33; T=2081)
   a. science 1322 (64.6%)
   b. social studies 519 (25.3%)
   c. both science and social studies 207 (10.1%)

7. Which best describes your teaching situation? (N=2062; M=19; T=2081)
   a. I teach the same group of students most of the day (e.g., I teach math, science, social studies, and language arts to the same students each day). 177 (8.6%)
   b. I teach the same subject to different students most of the day (e.g., I teach science to 7th and 8th grade students; my students change throughout the day). 1384 (67.1%)
   c. I teach several subjects each day to different classes of students (e.g., I teach math and science to 6th and 7th grade classes; my students change with each class). 501 (24.3%)

8. Does your school district have a written environmental education curriculum plan? (N=2015; M=66; T=2081)
   a. yes 355 (17.6%)
   b. no 1185 (58.8%)
   c. not sure 475 (23.6%)

9. Environmental education should be an important part of the total school curriculum. (N=2050; M=31; T=2081)
   a. strongly agree 1283 (62.6%)
   b. agree 723 (35.3%)
   c. not sure 30 (1.5%)
   d. disagree 3 (0.1%)
   e. strongly disagree 11 (0.5%)

10. It is important to include environmental education in my own teaching. (N=2048; M=33; T=2081)

a. strongly agree	1249 (61.0%)	d. disagree	2 (0.1%)
b. agree	755 (36.9%)	e. strongly disagree	10 (0.5%)
c. not sure	32 (1.6%)		

11. Approximately how much time each week do you spend teaching about the environment? (N=1924; M=157; T=2081)

a. no time	95 (4.9%)	d. 2-3 hours a week	161 (8.4%)
b. less than 30 minutes a week	1050 (54.6%)	e. more than 3 hours a week	96 (5.0%)
c. about 1 hour a week	522 (27.1%)		

12. Which is your primary source of **information** about environmental issues? (please circle **one**) (N=1762; M=319; T=2081)

a. my science textbook	264 (15.0%)	e. newspapers, magazines, and TV	907 (51.5%)
b. my social studies textbook	66 (3.7%)	f. high school or college textbooks	21 (1.2%)
c. general reference books, such as encyclopedias	29 (1.6%)	g. computer networks	8 (0.5%)
		h. other	143 (8.1%)
d. fact sheets from environmental organizations	324 (18.4%)		

13. Which is your primary source of **teaching materials** about environmental topics? (please circle **one**) (N=1888; M=193; T=2081)

a. my science textbook	417 (22.1%)	d. material I develop myself	915 (48.5%)
b. my social studies textbook	108 (5.7%)	e. supplementary environmental education curriculum materials	392 (20.8%)
c. my school's curriculum	56 (3.0%)		

Thank you for completing Section A.
Please go to Section B on page 38.

section B BIODIVERSITY EDUCATION

The purpose of this section is to assess general information and needs regarding your teaching as it relates to biodiversity and related issues.

In this section, please use the definitions below and your knowledge about biodiversity to answer each question.

Biodiversity refers to the variety of life on Earth. It is a contraction of biological diversity and includes genetic diversity, species diversity, and ecosystem diversity.

A **Biodiversity Education Program** can help students become knowledgeable about issues related to biodiversity and help them develop the commitment and skills to maintain or enhance biodiversity at local, regional, or global levels. Here are a few of the topics that might be included in a biodiversity education program:

—causes and consequences of loss of species and habitats
—the value of biodiversity (food, medicine, and so on)
—how environmental problems such as global climate change and pollution affect biodiversity
—sustainable development, and how it relates to biodiversity
—role of indigenous cultures
—the link between population issues and biodiversity
—the connection between biodiversity and economic issues
—how your students can get involved in biodiversity issues

1. I understand the concept of biodiversity. (N=2051; M=30; T=2081)

a. strongly agree	760 (37.1%)	d. disagree	13 (0.6%)
b. agree	1121 (54.7%)	e. strongly disagree	5 (0.2%)
c. not sure	152 (7.4%)		

2. I feel comfortable teaching about biodiversity and related issues. (N=2046; M=35; T=2081)

a. strongly agree	623 (30.4%)	d. disagree	72 (3.5%)
b. agree	1018 (49.8%)	e. strongly disagree	7 (0.3%)
c. not sure	326 (15.9%)		

3. Teaching about biodiversity should be an important part of the school curriculum. (N=2047; M=34; T=2081)

a. strongly agree	794 (38.8%)	d. disagree	3 (0.1%)
b. agree	1109 (54.2%)	e. strongly disagree	3 (0.1%)
c. not sure	138 (6.7%)		

4. A need exists for teacher workshops designed to provide educators with the knowledge and skills needed to help students become literate about biodiversity. (N=2048; M=33; T=2081)

a. strongly agree	989 (48.3%)	d. disagree	15 (0.7%)
b. agree	929 (45.4%)	e. strongly disagree	3 (0.1%)
c. not sure	112 (5.5%)		

5. A need exists for educational resources designed to help middle school students become literate about biodiversity. (N=2048; M=33; T=2081)

a. strongly agree	1136 (55.5%)	d. disagree	5 (0.2%)
b. agree	842 (41.1%)	e. strongly disagree	3 (0.1%)
c. not sure	62 (3.0%)		

6. In a typical year, how often do you teach about biodiversity in your classroom? (N=1981; M=100; T=2081)

a. not at all	219 (11.1%)	d. full week	268 (13.5%)
b. 1-2 class periods	449 (22.7%)	e. more than a week	674 (34.0%)
c. 3-4 class periods	371 (18.7%)		

7. If you agree that biodiversity should be a part of the curriculum, which of the following is the most serious barrier to increasing your teaching of biodiversity? (N=1820; M=261; T=2081)

a. I don't understand the issue enough to teach about it.	79 (4.3%)
b. I lack materials.	842 (46.3%)
c. There's no room in the curriculum.	314 (17.3%)
d. I'm not sure how to fit it in with what I am currently required to teach.	247 (13.6%)
e. I think I spend enough time on this issue.	220 (12.1%)
f. other	118 (6.5%)

8. If World Wildlife Fund produced educational curriculum materials focusing on biodiversity, which would you prefer? (N=1902; M=179; T=2081)

a. a progressive unit that took approximately 2-4 class periods	153 (8.0%)
b. a progressive unit that took approximately 5-8 class periods	250 (13.1%)
c. a collection of separate teaching activities that could be adapted and sequenced as needed	1371 (72.1%)
d. a complete course that could serve as a science or social studies text	89 (4.7%)
e. other	39 (2.1%)

9. Which of the resources listed below would you find most helpful in enhancing your efforts to teach about biodiversity? (please circle your **first** choice only) (N=2002; M=79; T=2081)

a. printed background information for teachers	160 (8.0%)
b. articles, information, and booklets for students	494 (24.7%)
c. educational activities for teachers	329 (16.4%)
d. audiovisual resources (videos, videodiscs, slide shows, etc.)	441 (22.0%)
e. self-instructional activities, games, and workbooks for students	406 (20.3%)
f. posters and wall charts	22 (1.1%)
g. speakers who could come to my class to talk about biodiversity issues	81 (4.0%)
h. a computer network linking my students with other students in the United States and abroad	60 (3.0%)
i. periodic teleconferences	9 (0.4%)

10. Which of the resources listed above would be the **second** most helpful? (N=2000; M=81; T=2081)

a. 225 (11.3%)	d. 428 (21.4%)	g. 124 (6.2%)
b. 489 (24.5%)	e. 334 (16.7%)	h. 68 (3.4%)
c. 259 (13.0%)	f. 66 (3.3%)	i. 7 (0.4%)

11. Which would be **third** most helpful? (N=1981; M=100; T=2081)

a. 221 (11.2%)	d. 388 (19.6%)	g. 224 (11.3%)
b. 322 (16.3%)	e. 316 (16.0%)	h. 115 (9.8%)
c. 217 (11.0%)	f. 162 (8.2%)	i. 16 (0.8%)

How useful would the following resources be in helping you teach about biodiversity?

12. Computer software (games, information, activities, etc.) (N=2035; M=46; T=2081)

a. very useful	824 (40.5%)	c. not useful	380 (18.7%)
b. moderately useful	831 (40.8%)		

13. Non-computer games (board games, simulations) (N=2036; M=45; T=2081)

a. very useful	894 (43.9%)	c. not useful	223 (11.0%)
b. moderately useful	919 (45.1%)		

14. An updated guide to the educational offerings at zoos, aquariums, nature centers, botanical gardens, museums, and other institutions in my area (N=2032; M=49; T=2081)

a. very useful	966 (47.5%)	c. not useful	262 (12.9%)
b. moderately useful	804 (39.6%)		

15. When using audiovisual materials, which format do you use **most**? (N=2008; M=73; T=2081)

a. video	1767 (88.0%)	e. 16-mm film	29 (1.4%)
b. interactive videodisc	116 (5.8%)	f. filmstrips	54 (2.7%)
c. interactive CD Rom	21 (1.0%)	g. cassettes	7 (0.3%)
d. slide program	14 (0.7%)		

16. If World Wildlife Fund developed one type of audiovisual program focusing on biodiversity, which format listed above would be **most** useful to you? (N=1993; M=88; T=2081)

a. 1587 (79.6%)	d. 21 (1.1%)	f. 26 (1.3%)
b. 254 (12.7%)	e. 16 (0.8%)	g. 8 (0.4%)
c. 81 (4.1%)		

17. Which would be **least** useful to you? (N=1946; M=135; T=2081)

a. 6 (0.3%)	d. 136 (7.0%)	f. 306 (15.7%)
b. 140 (7.2%)	e. 547 (28.1%)	g. 408 (21.0%)
c. 403 (20.7%)		

Thank you for completing Section B.
Please go to Section C on page 41.

section C

NONFORMAL INSTITUTIONS

The purpose of this section is to assess your interest in using nonformal education facilities.

Use the information in the following statement to help answer questions in this section.

> **Nonformal Education Institutions** include zoos, aquariums, botanical gardens, museums, science centers, and nature centers. Many of these institutions offer environmental education programs that enhance formal education programs for 6th, 7th, 8th, and 9th graders and provide teacher workshops and courses for graduate credit.

1. Nonformal institutions in my community enhance environmental education efforts for middle school students and educators. (N=2016; M=65; T=2081)

a. strongly agree	391 (19.4%)	d. disagree	268 (13.3%)
b. agree	887 (44.0%)	e. strongly disagree	96 (4.8%)
c. not sure	374 (18.6%)		

2. How often do you take your students to nonformal education institutions? (N=2026; M=55; T=2081)

a. I don't take my students to these facilities.	562 (27.7%)
b. I take my students on 1-2 trips every year.	955 (47.1%)
c. I take my students on 3-4 trips every year.	135 (6.7%)
d. I take my students on 5 or more trips every year.	34 (1.7%)
e. I don't take my students, but I encourage them to visit these facilities on the weekend.	340 (16.8%)

3. To what extent do staff from these nonformal institutions come to your school to present classes or programs to your students? (N=2027; M=54; T=2081)

a. never	1130 (55.7%)
b. They conduct at least one program for my students every year.	606 (29.9%)
c. They conduct 2-4 programs for my students every year.	130 (6.4%)
d. They conduct more than 4 programs every year.	15 (0.7%)
e. They conduct programs for several classes at the same time at least once a year.	44 (2.2%)
f. other	102 (5.0%)

4. In your classroom, do you use educational materials that were developed by local nonformal institutions? (N=2006; M=75; T=2081)

a. yes	991 (49.4%)
b. no	1014 (50.5%)

If you are not currently using nonformal institutions, please go to question 9 on the next page.
If you currently use these institutions, please answer questions 5-8.

5. Which **one** of the following best describes the most common type of experience your students have had on a visit to these nonformal institutions? (N=1022; M=1059; T=2081)

a. less than a 1-hour education program led by a trained staff person at the facility	385 (37.7%)
b. longer education programs (1-3 hours) led by a trained staff person at the facility	286 (28.0%)
c. on-going educational programs led by a trained staff person (programs meet several times a month or several times a year)	23 (2.3%)
d. teacher-led experience at the facility	328 (32.1%)

6. Which of the following best describes your use of nonformal institutions? (N=1028; M=1053; T=2081)
   a. to enhance a specific topic in my curriculum 548 (53.3%)
   b. to provide an unstructured field day for my students 68 (6.6%)
   c. to provide a separate enrichment experience for my students 412 (40.1%)

7. Which **one** of the following best describes your feelings about conducting lessons before or after visiting a nonformal institution? (N=1017; M=1064; T=2081)
   a. I usually conduct pre- and post-visit activities with my students, using materials and activity ideas from the nonformal institution. 376 (37.0%)
   b. I usually conduct pre- and post-visit activities with my students, using materials and activities I develop myself. 484 (47.6%)
   c. I usually don't conduct pre- and post-visit activities because I don't have time. 42 (4.1%)
   d. I usually don't conduct pre- and post-visit activities because I don't have the right materials and information. 73 (7.2%)
   e. I don't conduct pre- and post-visit activities. Students get the information they need while visiting these institutions. 42 (4.1%)

8. How often do you attend teacher workshops at these nonformal institutions? (N=1069; M=1012; T=2081)
   a. never attend 529 (49.5%)
   b. 1-2 times per year 486 (45.5%)
   c. 3-5 times per year 44 (4.1%)
   d. more than 5 times per year 10 (0.9%)

9. Which one of the following is the **most** serious barrier to increasing your use of nonformal institutions? (N=1965; M=116; T=2081)
   a. lack of funds 898 (45.7%)
   b. lack of transportation to the facility 207 (10.5%)
   c. no time for lesson plan development 109 (5.5%)
   d. not applicable or related to my curriculum 54 (2.7%)
   e. too many scheduling problems 282 (14.4%)
   f. no chaperons available 14 (0.7%)
   g. lack of knowledge about what is available at these facilities 143 (7.3%)
   h. don't feel these facilities offer programs that would enhance my teaching 21 (1.1%)
   i. no nearby facilities 237 (12.1%)

10. Which is the **second** most serious barrier? (N=1934; M=147; T=2081)
    a. 425 (22.0%)
    b. 565 (29.2%)
    c. 151 (7.8%)
    d. 64 (3.3%)
    e. 364 (18.8%)
    f. 48 (2.5%)
    g. 178 (9.2%)
    h. 24 (1.2%)
    i. 115 (5.9%)

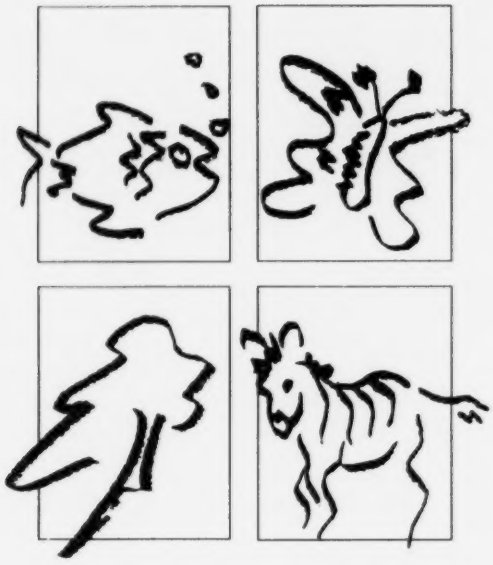
11. Which is the **third** most serious barrier? (N=1792; M=289; T=2081)
    a. 243 (13.6%)
    b. 233 (13.0%)
    c. 210 (11.7%)
    d. 74 (4.1%)
    e. 410 (22.9%)
    f. 125 (7.0%)
    g. 253 (14.1%)
    h. 73 (4.1%)
    i. 171 (9.5%)

12. If nonformal facilities were to offer programs about biodiversity, which would your prefer? (N=1994; M=87; T=2081)
    a. to go to the facility with my class 258 (12.9%)
    b. to have staff member from the facility visit my class 313 (15.7%)
    c. both 1423 (71.4%)

Thank you for completing Section C.

Appendix 4

WINDOWS ON THE WILD℠



Nonformal Education Survey and Results

This survey was developed by World Wildlife Fund and the University of Wisconsin-Stevens Point, Center for Environmental Education, with support from Eastman Kodak Company.

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WWF

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section A GENERAL INFORMATION

The purpose of this section is to find out some general information about your institution and programs. Please circle one answer for each question.

1. Please indicate your affiliation: (Valid N=667; Missing=41; Total=708)

a. private, not-for-profit	354 (53.1%)	e. regional	9 (1.3%)
b. private, for-profit	16 (2.4%)	f. state	51 (7.6%)
c. city	88 (13.2%)	g. federal	25 (3.7%)
d. county	67 (10.0%)	h. school/university	57 (8.5%)

2. Which best describes your facility? (N=661; M=47; T=708)

a. aquarium	15 (2.3%)	e. nature center or environmental	
b. botanical garden	83 (12.6%)	education center	255 (38.6%)
c. museum	171 (25.9%)	f. zoo	79 (12.0%)
d. science center	58 (8.8%)		

3. Which best describes the community you serve? (N=648; M=60; T=708)

a. rural	112 (17.3%)	c. small to medium urban	
b. suburban	95 (14.7%)	(less than 100,000)	140 (21.6%)
		d. large urban (more than 100,000)	301 (46.5%)

4. Please indicate the number of paid educational staff that work at your facility: (N=677; M=31; T=708)

a. 0	43 (6.4%)	f. 7-10 full-time	49 (7.2%)
b. 1 part-time	62 (9.2%)	g. 11-15 full-time	28 (4.1%)
c. 1-2 full-time	240 (35.5%)	h. 16-20 full-time	11 (1.6%)
d. 3-4 full-time	141 (20.8%)	i. more than 20 full-time	42 (6.2%)
e. 5-6 full-time	61 (9.0%)		

5. Approximately how many volunteers conduct educational programs at your institution? (N=700; M=8; T=708)

a. 0-20	423 (60.4%)	d. 101-200	38 (5.4%)
b. 21-50	129 (18.4%)	e. over 200	35 (5.0%)
c. 51-100	75 (10.7%)		

6. Which range best reflects the **total** annual visitation at your facility? (N=688; M=20; T=708)

a. 0-10,000	122 (17.7%)	e. 500,000-1 million	45 (6.5%)
b. 10,000-50,000	210 (30.5%)	f. 1-2 million	29 (4.2%)
c. 50,000-200,000	175 (25.4%)	g. 3-4 million	5 (0.7%)
d. 200,000-500,000	97 (14.1%)	h. 5 million or more	5 (0.7%)

7. What percentage of your **total** visitation is made up of school groups? (N=679; M=29; T=708)

a. fewer than 10%	114 (16.8%)	d. 51-75%	107 (15.8%)
b. 11-25%	223 (32.8%)	e. 76-100%	59 (8.7%)
c. 26-50%	176 (25.9%)		

8. What percentage of your **total** visitation (school and general) takes part in scheduled education programs that last at least one hour? (N=681; M=27; T=708)

a. 0%	19 (2.8%)	d. 26-50%	131 (19.2%)
b. 1-10%	203 (29.8%)	e. over 50%	192 (28.2%)
c. 11-25%	136 (20.0%)		

9. Which audience makes up the **largest** percentage of your scheduled educational programs that last at least one hour? (N=666; M=42; T=708)

a. school groups	549 (82.4%)	d. adults	52 (7.8%)
b. teachers	8 (1.2%)	e. senior citizens	7 (1.1%)
c. families	50 (7.5%)		

10. Which audience makes up the **second** largest percentage of your scheduled educational programs that last at least one hour? (N=645; M=63; T=708)

a. school groups	67 (10.4%)	d. adults	156 (24.2%)
b. teachers	111 (17.2%)	e. senior citizens	40 (6.2%)
c. families	271 (42.0%)		

11. What percentage of your scheduled educational programs are targeted for school groups? (N=672; M=36; T=708)

a. 0%	17 (2.5%)	d. 41-60%	139 (20.7%)
b. 1-20%	114 (17.0%)	e. 61-80%	155 (23.1%)
c. 21-40%	87 (12.9%)	f. more than 80%	160 (23.8%)

If school groups visit your facility, please answer questions 12-16.
If school groups do not visit your facility, please go to question 17 on page 46.

For this survey, we are defining middle school students as those in grades 6, 7, 8, and 9.
We realize that this varies throughout the country and may not be the case in your area.

12. Which represents your **largest** school audience? (N=669; M=39; T=708)

a. preschool	9 (1.3%)	d. grades 10-12	7 (1.0%)
b. grades K-5	577 (86.2%)	e. university students	7 (1.0%)
c. grades 6-9	68 (10.2%)		

13. What percentage of school groups that visit your facility are middle school level? (N=667; M=41; T=708)

a. 0%	18 (2.7%)	e. 16-20%	80 (12.0%)
b. 1-5%	167 (25.0%)	f. 21-25%	51 (7.6%)
c. 6-10%	139 (20.8%)	g. 26-30%	52 (7.8%)
d. 11-15%	83 (12.4%)	h. more than 30%	77 (11.5%)

14. Does your institution provide scheduled environmental education programs for middle school students? (N=670; M=38; T=708)

a. yes	413 (61.6%)
b. no	257 (38.4%)

15. Our institution believes it is important to provide more environmental education programs for middle school students. (N=670; M=38; T=708)

a. strongly agree	312 (46.6%)	d. disagree	12 (1.8%)
b. agree	287 (42.8%)	e. strongly disagree	2 (0.3%)
c. not sure	57 (8.5%)		

16. What are the constraints to conducting more environmental education programs for middle school students at your institution?

17. To what extent do you use the following audiovisual materials at your institution? (please circle **one** for each item)

computer software (N=682; M=26; T=708)

a. to a great extent	107 (15.8%)
b. to some extent	252 (37.3%)
c. to no extent	317 (46.9%)

interactive videodisc or CD ROM (N=665; M=43; T=708)

a. to a great extent	14 (2.1%)
b. to some extent	94 (14.1%)
c. to no extent	557 (83.8%)

video (N=683; M=25; T=708)

a. to a great extent	87 (12.7%)
b. to some extent	496 (72.6%)
c. to no extent	100 (14.6%)

slide/tape programs (N=683; M=25; T=708)

a. to a great extent	162 (23.8%)
b. to some extent	438 (64.2%)
c. to no extent	82 (12.0%)

television (N=670; M=38; T=708)

a. to a great extent	12 (1.8%)
b. to some extent	195 (29.1%)
c. to no extent	463 (69.1%)

18. Do you conduct environmental education workshops for teachers? (N=687; M=21; T=708)

a. yes	438 (63.8%)
b. no	249 (36.2%)

If you answered "yes" to question18, please answer questions 19 through 24.
If you answered "no," please go to Section B on page 48.

19. How many teachers take part in your teacher education workshops each year? (N=457; M=251; T=708)

a. fewer than 25	59 (12.9%)	f. 151-200	31 (6.8%)
b. 26-50	107 (23.5%)	g. 201-300	24 (5.3%)
c. 51-75	64 (14.0%)	h. 301-400	17 (3.7%)
d. 76-100	54 (11.8%)	i. 401-500	13 (2.9%)
e. 101-150	48 (10.5%)	j. more than 500	19 (4.2%)

20. What is the **typical** length of your teacher education workshops? (please circle **one**) (N=449; M=259; T=708)

a. 1 hour	12 (2.7%)	e. 2-3 days	67 (14.9%)
b. 2 hours	61 (13.6%)	f. 4-5 days	16 (3.6%)
c. 3-5 hours	159 (35.4%)	g. 6-8 days	5 (1.1%)
d. 6-8 hours	126 (28.1%)	h. more than 8 days	3 (0.7%)

21. Do you offer workshops that allow participants to earn college credit? (N=457; M=251; T=708)

a. yes	205 (44.9%)
b. no	252 (55.1%)

22. When do you hold most of your teacher workshops? (N=381; M=327; T=708)

a. during school hours	64 (16.8%)	c. on weekends during the school year	139 (36.5%)
b. after school	87 (22.8%)	d. during the summer	91 (23.9%)

23. Which **best** describes the most common type of workshops you provide for teachers? (please circle **one**) (N= 422; M=286; T=708)

a. workshops on specific topics (e.g., endangered species, air pollution, acid rain)	135 (30.0%)
b. workshops introducing teachers to a specific curriculum (e.g., Project Learning Tree, *NatureScope*, Aquatic WILD)	130 (30.8%)
c. workshops to help teachers better use your facility	88 (20.9%)
d. workshops on a specific exhibit or area in your facility	19 (4.5%)
e. other	50 (11.8%)

24. Which **best** describes your teacher workshops? (N= 465; M=244; T=708)

a. emphasis on teaching strategies (discovery learning, cooperative learning, thinking skills, how to conduct activities, etc.)	76 (16.4%)
b. emphasis on content (about environmental issues, specific species, etc.)	73 (15.7%)
c. an equal mix of both	315 (67.9%)

Thank you for completing Section A.
Please go to Section B on page 48.

section B BIODIVERSITY EDUCATION

The purpose of this section is to assess general information and needs regarding your educational programs as they relate to biodiversity and related issues.

In this section, please use the definitions below and your knowledge about biodiversity to answer each question.

Biodiversity refers to the rich variety of life on Earth. It is short for biological diversity and includes genetic diversity, species diversity, and ecosystem diversity.

A **Biodiversity Education Program** can help students become knowledgeable about issues related to biodiversity and help them develop the commitment and skills to maintain or enhance biodiversity at local, regional, and global levels. Here are a few of the topics that might be included in a biodiversity education program:

—causes and consequences of loss of species and habitats
—the value of biodiversity (food, medicine, aesthetics, ecosystem stability, etc.)
—how environmental problems such as global climate change and pollution affect biodiversity
—sustainable development, and how it relates to biodiversity
—the role of indigenous cultures
—the link between human population and biodiversity
—the connection between biodiversity and economic issues
—how students can get involved in biodiversity issues
—individual values related to biodiversity
—how consumer issues in the United States affect global biodiversity

1. Biodiversity education should be an important part of our institution's environmental education program. (N=694; M=14; T=708)

a. strongly agree	396 (57.1%)	d. disagree	7 (1.0%)
b. agree	252 (36.3%)	e. strongly disagree	4 (0.6%)
c. not sure	35 (5.0%)		

2. Our educational staff understands the concept of biodiversity and related issues. (N=685; M=23; T=708)

a. strongly agree	254 (37.1%)	d. disagree	16 (2.3%)
b. agree	340 (49.6%)	e. strongly disagree	2 (0.3%)
c. not sure	73 (10.7%)		

3. Our educational staff feels comfortable teaching about biodiversity and related issues. (N=683; M=25; T=708)

a. strongly agree	186 (27.2%)	d. disagree	49 (7.2%)
b. agree	292 (42.8%)	e. strongly disagree	5 (0.7%)
c. not sure	151 (22.1%)		

4. Our education staff could use additional training to conduct educational programs for middle school teachers about biodiversity. (N=691; M=17; T=708)

a. strongly agree	280 (40.5%)	d. disagree	17 (2.5%)
b. agree	351 (50.8%)	e. strongly disagree	3 (0.4%)
c. not sure	40 (5.8%)		

5. Does your institution currently conduct any workshops for teachers that address biodiversity or related issues? (N=699; M=9; T=708)

a. yes	248 (35.5%)
b. no	451 (64.5%)

If yes, please answer question 6. If no, please go to question 7.

6. Which **best** describes the types of biodiversity-related workshops that you offer for teachers? (N=263; M=445; T=708)

a. We conduct specific workshop(s) on biodiversity.	3 (1.1%)
b. We include the concept in other workshop(s).	214 (81.4%)
c. We offer specific workshop(s) on biodiversity and also include the concept in other workshops.	33 (12.5%)
d. other	13 (4.9%)

7. To what extent does your institution provide scheduled educational programs for **middle school students** addressing biodiversity and related issues? (please circle **one**) (N=263; M=445; T=708)

a. We conduct specific programs on biodiversity.	16 (2.6%)
b. We include the concept in other programs.	316 (51.0%)
c. We offer specific programs on biodiversity and also include the topic in other programs.	39 (6.3%)
d. We offer none at this time.	179 (28.9%)
e. We offer none at this time, but are planning to in the future.	70 (11.3%)

8. If you provide scheduled programs for middle school students, which is the **most** common method used to educate them about biodiversity and related issues? (N=457; M=251; T=708)

a. general guided tours	107 (23.4%)	d. outside speakers	6 (1.3%)
b. specific exhibit or display programs	27 (5.9%)	e. educational activities at your facility	214 (46.8%)
c. classroom visits	70 (15.3%)	f. other	33 (7.2%)

9. Which of the above is the **second** most common method used? (N=399; M=309; T=708)

a. general guided tours	88 (22.1%)	d. outside speakers	6 (1.5%)
b. specific exhibit or display programs	97 (24.3%)	e. educational activities at your facility	93 (23.3%)
c. classroom visits	98 (24.6%)	f. other	17 (4.3%)

10. Which **best** describes the types of educational materials you use with middle school students? (N=432; M=276; T=708)

a. We use materials that we develop ourselves about biodiversity.	243 (56.2%)
b. We use materials produced by other organizations (PLT, Project WILD, Project WIZE, *NatureScope*, etc.).	189 (43.8%)

Thank you for completing Section B.
Please go to Section C on page 50.

section C

WWF'S NEW BIODIVERSITY PROGRAM

The purpose of this section is to find out your thoughts about participating in WWF's new biodiversity program.

Please use the following information to answer questions in this section.

Through a grant from Eastman Kodak Company, World Wildlife Fund (WWF) is developing an environmental education program for middle school students that focuses on biodiversity. The program, called *Windows on the Wild,* is also designed to help strengthen the links between formal and nonformal educational institutions. At this time, the project has four major phases:

Phase I: Conduct a national needs assessment of middle school teachers and nonformal educators and publish the results. Survey and evaluate current educational materials and programs that address biodiversity.

Phase II: Based on the results from the needs assessment, work with middle schools and nonformal institutions to develop, adapt, and pilot educational materials about biodiversity for middle school students. These materials would incorporate the "best" of what is available and fill existing gaps.

Phase III: Send out a Request for Proposals (RFP) to educational institutions to apply for funds to develop local biodiversity education programs that create or enhance partnerships between nonformal institutions and middle school teachers. WWF would fund selected pilots that meet certain criteria, which could include innovative collaboration strategies, teacher training efforts, local materials development and adaptation, and so on.

Phase IV: Evaluate each pilot and expand the program based on our findings.

1. Our institution would be interested in participating in the *Windows on the Wild* pilot program as outlined above. (N=686; M=22; T=708)

a. strongly agree	321 (46.8%)	d. disagree	23 (3.4%)
b. agree	174 (25.4%)	e. strongly disagree	4 (0.6%)
c. not sure	164 (23.9%)		

2. Which of the following teaching materials do you think would be **most** effective for biodiversity education at your institution? (N=684; M=24; T=708)

a. printed, age-appropriate background information for students (in grades 6, 7, 8, and 9)	58 (8.5%)
b. printed background information for teachers	56 (8.2%)
c. audiovisual materials	43 (6.3%)
d. educational activity guides	233 (34.1%)
e. posters/wall charts	16 (2.3%)
f. interactive computer software	23 (3.4%)
g. ready-to-use simulations, role plays, and games (non-computer)	97 (14.2%)
h. self-guided materials for teachers to use with their classes at your facility	142 (20.8%)
i. computer network and supporting materials linking formal and nonformal educators	16 (2.3%)

3. From the list on page 50, which would be your **second** choice? (N=677; M=31; T=708)

a. 101 (14.9%)	d. 141 (20.8%)	g. 102 (15.1%)
b. 116 (17.1%)	e. 17 (2.5%)	h. 85 (12.6%)
c. 67 (9.9%)	f. 24 (3.5%)	i. 24 (3.5%)

4. Which would be your **third** choice? (N=669; M=39; T=708)

a. 103 (15.4%)	d. 90 (13.5%)	g. 86 (12.9%)
b. 123 (18.4%)	e. 26 (3.9%)	h. 80 (12.0%)
c. 84 (12.6%)	f. 50 (7.5%)	i. 27 (4.0%)

5. To provide a link between biodiversity programs at your institution and middle school teachers and students, which of the following would be **most** important for your institution? (N=674; M=34; T=708)

a. help in developing teacher training programs that focus on biodiversity education	213 (31.6%)
b. printed materials for teachers that provide background information about biodiversity	90 (13.4%)
c. printed materials for students about biodiversity	39 (5.8%)
d. staff training for your institution about biodiversity	99 (14.7%)
e. help in developing traveling exhibits and accompanying materials about biodiversity	79 (11.7%)
f. support to disseminate biodiversity materials produced by WWF	25 (3.7%)
g. help in developing pre-visit and post-visit activities related to biodiversity education	110 (16.3%)
h. other	19 (2.8%)

6. Which would be your **second** choice? (N=672; M=36; T=708)

a. 117 (17.4%)	d. 96 (14.3%)	g. 132 (19.6%)
b. 138 (20.5%)	e. 77 (11.5%)	h. 4 (0.6%)
c. 74 (11.0%)	f. 34 (5.1%)	

7. Which would be your **third** choice? (N=657; M=51; T=708)

a. 93 (14.2%)	d. 64 (9.7%)	g. 129 (19.6%)
b. 107 (16.3%)	e. 76 (11.6%)	h. 11 (1.7%)
c. 121 (18.4%)	f. 56 (8.5%)	

8. As we develop our biodiversity education program, we have an opportunity to focus on a variety of related topics. Which of the following **environmental issues** do you feel is **most** important for WWF to incorporate into the *Windows on the Wild* program? (N=687; M=21; T=708)

a. global warming	5 (0.7%)	g. hazardous waste/toxics	8 (1.2%)
b. ozone depletion	6 (0.9%)	h. human population growth and resource use	229 (33.3%)
c. air quality	7 (1.0%)	i. loss of species and habitat (rain forests, coral reefs, etc.)	302 (44.0%)
d. water quality/water conservation	52 (7.6%)	j. other	32 (4.7%)
e. soil erosion/desertification	1 (0.1%)		
f. solid waste management/recycling	45 (6.6%)		

9. Which of the topics listed above would be your **second** choice? (N=680; M=28; T=708)

a. 25 (3.7%)	e. 24 (3.5%)	h. 170 (25.0%)
b. 8 (1.2%)	f. 70 (10.3%)	i. 196 (28.8%)
c. 20 (2.9%)	g. 20 (2.9%)	j. 13 (1.9%)
d. 134 (19.7%)		

10. Which would be your **third** choice? (N=645; M=63; T=708)

a. 44 (6.8%)	e. 76 (11.8%)	h. 81 (12.6%)
b. 14 (2.2%)	f. 106 (16.4%)	i. 66 (10.2%)
c. 28 (4.3%)	g. 52 (8.1%)	j. 25 (3.9%)
d. 153 (23.7%)		

11. Which of the following **topics or concepts** would you like WWF to emphasize **most** in its *Windows* program? (N=690; M=18; T=708)

a. ecological principles	322 (46.7%)	e. geography and the environment	38 (5.5%)
b. risk assessment	5 (0.7%)	f. technology and the environment	33 (4.8%)
c. sustainable development	68 (9.9%)	g. consumption and lifestyle issues	191 (27.7%)
d. environmental economics	23 (3.3%)	h. other	10 (1.4%)

12. Which of the topics listed above would be your **second** choice? (N=682; M=26; T=708)

a. 124 (18.2%)	d. 94 (13.8%)	g. 160 (23.5%)
b. 28 (4.1%)	e. 96 (14.1%)	h. 5 (0.7%)
c. 106 (15.5%)	f. 69 (10.1%)	

13. Which of the topics listed in question 11 would be your **third** choice? (N=671; M=37; T=708)

a. 77 (11.5%)	d. 112 (16.7%)	g. 143 (21.3%)
b. 37 (5.5%)	e. 68 (10.1%)	h. 6 (0.9%)
c. 113 (16.8%)	f. 115 (17.1%)	

14. Which of the following **strategies** would you **most** like to see included in WWF's *Windows on the Wild* program? (N=686; M=22; T=708)

a. strategies to help improve students' critical and creative thinking skills, including problem-solving skills	306 (44.6%)
b. strategies for facilitating discussions about attitudes and values	46 (6.7%)
c. strategies for helping students get involved in local environmental action projects	64 (9.3%)
d. strategies for improving student citizen action skills	10 (1.5%)
e. strategies for facilitating controversial issues in the classroom	4 (0.6%)
f. strategies for catering to various learning styles	26 (3.8%)
g. strategies for implementing effective cooperative learning in the classroom	14 (2.0%)
h. strategies for infusing environmental education throughout the curriculum	208 (30.3%)
i. other	8 (1.2%)

15. Which of the strategies listed above would be your **second** choice? (N=678; M=30; T=708)

a. 153 (22.6%)	d. 34 (5.0%)	g. 41 (6.0%)
b. 105 (15.5%)	e. 36 (5.3%)	h. 123 (18.1%)
c. 135 (19.9%)	f. 49 (7.2%)	i. 2 (0.3%)

16. Which would be your **third** choice? (N=664; M=44; T=708)

a. 82 (12.3%)	d. 52 (7.8%)	g. 73 (11.0%)
b. 106 (16.0%)	e. 49 (7.4%)	h. 121 (18.2%)
c. 117 (17.6%)	f. 60 (9.0%)	i. 4 (0.6%)

17. If WWF developed one of the following, which would be **most** helpful to your institution? (N=684; M=24; T=708)

a. a portable traveling exhibit/program focusing on biodiversity	149 (21.8%)
b. an interactive videodisc exhibit or kiosk focusing on biodiversity	46 (6.7%)
c. slide/tape programs focusing on biodiversity	36 (5.3%)
d. videos focusing on biodiversity and related issues	61 (8.9%)
e. photo CDs of biodiversity images	2 (0.3%)
f. a resource kit to help train teachers and "trainers" (including information on how to design and implement environmental education training workshops)	368 (53.8%)
g. other	22 (3.2%)

18. If WWF sponsored a photo/essay contest or a video/essay contest for middle schools students that focused on some aspect of biodiversity, would your institution participate? (N=686; M=22; T=708)

a. yes	274 (39.9%)
b. no	65 (9.5%)
c. unsure	347 (50.6%)

Thank you for completing Section C.

Thank you very much for completing this survey. Your responses will be extremely valuable in helping us develop new educational materials and programs.

Appendix 5: Framework

Please offer teacher training programs so that we can do a better job of educating about this very important topic.

7-8th Grade Teacher
Gulfport, MS

Draft Biodiversity Education Framework

Introduction

Scientists estimate that we may be losing one plant or animal species every 20 minutes worldwide. For each species that disappears, we are also losing unknown numbers of populations and unique gene pools. And around the world, entire ecosystems have been diminished to mere fragments. Understanding the causes behind this loss of biodiversity, the reasons it matters, and ways we can address the problem means understanding a lot about the way the world works. It means understanding ecology and our place in the environment; the social, political, and economic considerations that factor into our decisions; the ways the environment and different peoples are affected by decisions; and the impacts individual choices have on the quality of life. It also means developing skills to identify problems and find solutions. In short, it means becoming environmentally literate.

Windows on the Wild uses biodiversity to teach environmental literacy. The program takes advantage of the natural connections between understanding biodiversity issues and environmental literacy. It teaches key concepts and examines biodiversity issues. It also develops in students the experiences, models for effective action, critical thinking skills, and personal commitments they need to tackle environmental issues. In addition, the program will provide them with the opportunity to take part in a variety of relevant and innovative learning experiences.

The Framework

The information in this framework is divided into four sections: key concepts, biodiversity issues, actions and skills, and sample experiences. The key concepts section includes what biodiversity is, what factors are affecting biodiversity, and ways biodiversity is important. The issues section addresses the many interrelated social, cultural, political, economic, and technological issues that are part of biodiversity protection solutions. The actions and skills included in the third section reflect one of the ultimate goals of the program: developing in students those commitments, thinking skills, and action strategies they'll need to creatively and effectively tackle environmental issues throughout their lives. Finally, because students have a variety of learning styles and because solutions to problems often involve different kinds of actions, we've included an experiences section that highlights some of the variety of learning experiences students will take part in over the course of this program.

Help! I need updated, non-biased material about biodiversity—especially the relationship between economic issues and environmental issues. I also need to know how individuals in this country affect loss of biodiversity worldwide.

9th Grade Teacher
New York, NY

I. Key Concepts

Definition

- Biological diversity, or "biodiversity," encompasses the variety of all life on Earth—from microscopic plants to blue whales. It also includes the variety of ecosystems and ecological processes that sustain this life.
- Biodiversity is commonly analyzed at these three levels:
  - — Ecosystem diversity refers to the variety of habitats, biological communities, and ecosystems where organisms live and evolve. It also refers to the variety of ecological processes within ecosystems.
  - — Species diversity describes the numbers and variety of organisms that live on Earth.
  - — Genetic diversity refers to the sum total of genetic information contained in the genes of organisms. This can be examined at the level of individuals, populations, or species.

Factors Affecting Biodiversity

- Natural systems are dynamic and disturbances help maintain ecosystem health. Small scale disturbances, such as a tree falling in a forest, can actually maintain or increase biodiversity.
- Biodiversity is the key to the resilience of nature after intense changes in environmental conditions such as floods, earthquakes, hurricanes, and volcanic eruptions.
- Human-induced changes in the environment, such as pollution, habitat degradation, and the introduction of exotic species, push the limits of nature's resilience and may lead to irreversible environmental damage and biodiversity loss on human time scales.
- Biodiversity is reduced by changes in the environment that exceed the ability of populations of plants, animals, and other living things to adapt. This inability to adapt to changing environmental conditions leads to the extinction of species— either locally or globally.
- Human populations are growing at an exponential rate and, as they grow, they expand and alter the natural environment at ever faster rates that can lead to accelerated, permanent loss of biodiversity.
- The loss and degradation of entire ecosystems, such as forests, wetlands, and coastal waters, is the single most important factor behind the current extinction of species. This large-scale degradation is the result of human population growth, pollution, and nonsustainable consumption patterns.

The Value of Biodiversity

- Biodiversity helps support life on Earth in many ways. For example, genetic diversity within species allows species to adapt to changes in the environment over time; species diversity provides a variety of interactions that contribute to energy flow and nutrient cycling in ecosystems; and ecosystem diversity provides a suite of ecological "services" that maintain the biosphere, including water and air purification, micro-climate control, and soil stability.

- Human welfare depends on biological diversity for economic benefits such as sustaining and improving agriculture and providing opportunities for medical discoveries and industrial innovations.
- People value biodiversity for aesthetic, moral, spiritual, educational, economic, recreational, and other reasons.
- Culture is closely linked to biodiversity. Our cultures are shaped, in part, by the environment. And our collective knowledge of biodiversity, including its use and management, is linked to the many ways different cultures interact with the environment. Efforts to conserve biodiversity must be developed within the constructs of local cultures. Conversely, conserving biodiversity often helps strengthen cultural integrity and values.

II. Biodiversity Issues

- There are many interrelated political, economic, and social issues that develop as a result of human impact on biodiversity.
- Environmental problems associated with biodiversity loss don't always adversely affect all people in a region equally—they often disproportionately affect only certain populations, such as low-income communities.
- Biodiversity issues are associated with conflicts in values and beliefs.
- Individuals play an important role in resolving biodiversity problems and issues.
- Scientific and technological means exist to manage and protect biodiversity; however, science and technology may not always be adequate to resolve biodiversity problems and issues.
- Sociopolitical (educational/legal/economic/political/cultural) processes and institutions can be used to resolve biodiversity issues.

III. Actions and Skills

Students should be able to:

- identify changes in biodiversity at their local level.
- investigate and analyze patterns and structural foundations of biodiversity issues.
- synthesize and evaluate gathered information, including biographies of heroes and success stories, to identify models and alternate solutions.
- clarify and analyze their own values and priorities relating to biodiversity issues.
- identify alternative values or priorities held by others on biodiversity issues.
- participate effectively in group problem solving activities.
- effectively communicate ideas and information about biodiversity issues.
- effectively implement selected actions regarding local and global biodiversity problems and solutions.
- know how to work cooperatively with others to establish objectives and develop new habits of thinking, valuing, and acting.

I could really use innovative audiovisual materials. Most of what is available on this topic is not very good.

8th Grade Teacher
Minneapolis, MN

Students have a perception that the environment is capable of always correcting any environmental problem. Students need to think more about local and global environmental problems.

7th Grade Teacher
Lutherville, MD

IV. Sample Experiences

To learn the concepts and skills in this framework students will be involved in a variety of learning experiences, including:

- community investigations using cameras and other tools
- visits to nonformal institutions to take part in hands-on explorations and discoveries related to wildlife and wildlands
- interviews and interactions with culturally diverse students, community leaders, and parents
- plant and animal "adoption" and "neighborhood restoration" programs
- research using primary and secondary resources
- mentoring programs that encourage partnerships between students and community members and younger and older students
- simulation games to accelerate learning of complex relationships among biodiversity concepts and issues

Appendix 6: Advisory Board

Maria Bober
Coordinator
Worldwide Environmental Communications
Eastman Kodak Company

Daniel Bogan
Environmental Science Teacher
The Sidwell Friends School

Jeffery Bryant
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Monterey Bay Aquarium

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